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PREFACE TO SIXTH EDITION.

In preparing a new edition of this Handbook of Therapeutics, especially intended for students and young practitioners, I have endeavoured to make it as practical as possible.

The method I have adopted in this work is to follow out in a certain order, in detail, the physiological and therapeutic action of individual drugs on the body. For the most part I have treated of a drug's action, first on the skin, next on the mouth, then the stomach, the intestines, the blood, the nervous system, the lungs, the heart, and finally on the excreting organs, dwelling most of course on the organ, or organs, mainly affected by the drug under consideration.

In this edition, I have endeavoured to put the reader in possession of the new facts observed, and to give an account of various important discoveries, made since the publication of previous editions. For instance, I have added Chapters on Salicine, Muscarin, Pilocarpine, and have considerably extended other chapters.

Moreover, I have improved the arrangement of the book and have relegated to the smaller type a large portion of the text, which, though intrinsically important, is of less practical interest to the therapeutist. The elaborate analytical index, prepared by the kind labour of my friend Dr. Theodore Maxwell, will I trust be found a time-saving and valuable addition to my Handbook.

The Author is anxious to express the great obligation he is under to his friend Dr. George Bird, who has assisted in revising this and several previous editions of the Handbook, and has increased its usefulness by many suggestions. Without his valuable assistance I should have found it difficult to complete this edition.

October, 1877.

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THERAPEUTICS.

◆

THE EFFECTS OF COLD ON THE BODY.

Before treating separately of the various kinds of cold baths, I think it will save repetition and prove otherwise useful to make some preliminary remarks on the effects of cold on the human body. These effects are various; according to the way cold is employed, it is a refrigerator, an anæsthetic, a tonic, an excitant, or a depressant.

The application of cold withdraws heat from the body, and cools both the superficial and deep parts. The general cold bath will produce a very considerable reduction of the heat of the surface to the extent even of 10° Fah. in the trunk, and even considerably lower in the extremities. The general cold bath might be supposed capable of reducing the heat of the body's surface for a considerable time; this, however, is not the case, for the skin of the trunk speedily becomes warm again, although for some hours afterwards the extremities may remain cold, and the temperature in the axilla almost recovers itself in a few minutes, although the bather may have been immersed half an hour, or longer, in water at a temperature of 60°.

Of course, it is not here maintained that heat is not abstracted from the body; but, as will be shown in another place, the loss is so rapidly restored, that the cold bath will not depress the skin's temperature in a healthy person for any notable time.

Cold sponging, so often employed in fevers with such evident relief, exerts a very slight and transient influence on the heat of the body, as may be ascertained by aid of the thermometer; hence the sense of comfort derived from the sponging cannot be ascribed wholly, or hardly in part, to its refrigerating influence. This relief may be due to the removal of impurities which perhaps irritate the skin, or annoy by their odour, and by mitigating the parched condition of the surface; for a skin both hot and dry is a source of much greater discomfort than a moist though even hotter skin. Sponging with tepid water so as to restore moisture to the parched skin, gives marked comfort to the patient.

The foregoing remarks apply only to the surface of the body; but the general cold bath will likewise reduce the temperature of the internal organs. This reduction, never very great, is restored to the deep even more quickly than to the superficial parts; so that as might be inferred, the general cold bath is still less efficient as a refrigerator of the internal than of the superficial organs. In fever-free persons, therefore, the general cold bath must rank very low as a refrigerator.

It is, however, otherwise with the body of a patient whose temperature is unnaturally raised by fever. The immersion of fever-stricken patients in the cold bath, or packing them with the cold sheet, will produce a considerable and durable lowering of the temperature. Whether this reduction is effected by abstraction of heat, or by preventing its unnatural formation, it is impossible at present to decide.

Cold, when judiciously employed, is well known to be a powerful tonic. A cold climate and cold bathing are tonic and bracing. The theory of the tonic action of cold may perhaps be stated thus:—During exposure to cold the body's loss of heat, as tested by the thermometer, is by no means a measure of the quantity withdrawn. Many observers have shown that at such times increased combustion occurs, whereby much of the lost heat is compensated, and the temperature is maintained or soon restored. This increased oxidation of the tissues is demonstrated by the greatly increased quantity of carbonic acid thrown off by the lungs on exposure to cold. Now the most vigorous health is best maintained by a rapid construction and destruction of tissues, within certain bounds, provided these two processes are fairly balanced. On exposure to cold, the lungs absorb more oxygen, the tissues are more rapidly and freely oxydized and thus the processes of destruction and reparation go on in larger measure. How is this effected?

In the process of nutrition, apart from the nerves, we have three factors, the nutritive plasma, the tissues, and oxygen. When food is taken, digested, and introduced into the blood, both formation and destruction of the nitrogenous tissues begin, formation being limited by destruction; and when the destruction of tissues ceases, the further assimilation of the nutritive materials of the blood comes likewise to an end. These destructive changes take place in proportion to the amount of oxygen absorbed, and when this gas is exhausted, many products of destruction remain only partially oxidized, further tissue disintegration ceases, and assimilation is suspended. (Parkes).

Under exposure to cold, oxygen being abundantly absorbed, the effete products in the blood are first consumed, thus purifying the blood and rendering it fit to nourish the body; next, by its consuming action on the tissues, oxygen promotes the cycle of changes just described, food is taken and assimilated, and the destruction and construction of the tissues rapidly go on, so creating great physical vigour. Thus it is that cold climates are invigorating.

Applied locally, cold may act as a tonic (see Douche); but if too long continued, or excessive, it depresses; for by contracting the vessels too sharply or two continuously, it lessens the supply of blood to the tissues, and thereby diminishes in them cell-growth and tissue change. Intense cold applied for some minutes, will abolish sensation, and in this way becomes an anæsthetic; and if the cold is too long continued, the part will die and become gangrenous.

The sudden partial application of cold may act as an excitant. —A cold hand applied to the abdomen excites contractions in the parturient womb. Cold water smartly sprinkled on the face of a swooning person is a familiar way of restoring consciousness. The same treatment will help to establish breathing in weak or apparently still-born children, or to recover persons over-dosed with chloroform, or narcotized with opium or tipple.

THE COLD BATH, INCLUDING SEA-BATHING.

Cold water may be employed for the sake of its moisture, its temperature, or both conjoined. If we require merely moisture, and temperature is of no consequence, tepid or warm water is both preferable and more agreeable. Cold water is generally employed to abstract heat from either the whole surface of the body, or from some particular part of it, or to induce general or local excitement and shock.

Since the skin absorbs neither the water of the bath, whether it be warm or cold, nor any substances, soluble or insoluble, which may be added to the water, it follows that whatever may be the effect of baths it must be explained by their direct action on the skin. Dr. Stillé, indeed, asserts that some absorption takes place with respect to substances dissolved in the cold bath though not in the hot bath; and Dr. Amory confirms this statement concerning bromides, for in a cold bath he says a "small amount may be absorbed" but in a hot one of 96° to 106° Fah. none. The quantity absorbed, however, is far too small to invalidate the foregoing general statement.

In treating of the general cold bath we shall speak mainly of cold sea-bathing, this being a far more powerful medicinal agent than the simple cold bath, although, indeed, their action is identical, the difference in their effects being one merely of degree; and as we proceed, we shall point out how these differences affect the body.

On entering a cold sea bath there is at first a sensation of depression, great or little, according to the coldness of the water. The skin becomes pale and shrivelled, and presents the familiar appearance called "goose-skin," a condition produced by the contraction of the skin, and the consequent protrusion of the hair roots and follicles. There is general shivering, some blueness of the lips, nose, and extremities, considerable reduction of the temperature of the skin, quickened pulse, convulsive and sobbing breathing as the water rises to the chest, especially when the bath is entered slowly. The system soon becoming roused to meet and to resist the depressing effects of cold, in a few seconds a sensation of general exhilaration ensues. The skin becomes ruddy, and glowing; the breathing full and easy; the pulse rather quick and strong; the spirits exalted, and the bather feels increased vigour, both of mind and body. If he quits the bath now, or before the period of exhilaration ceases, this buoyant condition endures more or less for the rest of the day, showing that the bath thus acts as a tonic to the system.

On the other hand, if the bath is prolonged, depression again comes on. The bather feels cold, shivers, becomes blue and numb in the more exposed and smaller parts, whence, on account of their size, warmth is more readily withdrawn, and he is seized with a sensation of depression and wretchedness. Baths prolonged to this injudicious extent often produce damaging results, which may continue for hours, and even days, sometimes, indeed, inflicting serious damage to the health, especially in a weak or growing person. For many hours after the bath he complains of general languor, with a repugnance to exercise, whether of body or mind; his temper is fretful and morose, the circulation feeble and languid with sinking at the epigastrium, loss of appetite, chilliness of the surface, and cold extremities. It need scarcely be said that consequences like these are to be carefully avoided; yet, these risks will often be encountered, unless the doctor gives specific and minute directions, so great is the prevailing ignorance and error on the subject of bathing.

If the exposure in the cold bath is continued beyond this point, or if the cold is severe, its effects become more manifest, great depression and a sensation of utter misery set in, followed shortly by heaviness and drowsiness, which deepen sometimes into coma, till a kind of apoplectic state is reached, then asphyxia and death from paralysis of the muscles of respiration.

Baths then, on the one hand, judiciously employed, are very powerful tonics, while, on the other, if unwisely used, they induce great depression of the bodily powers and produce serious mischief. The superiority of sea baths has been placed beyond mere surmise; for direct experiment has established the fact that a sea bath acts far more powerfully on tissue metamorphosis than the simple water bath. While the sea bath increases the process both of destruction and of construction of tissue, yet that of construction is in excess of that of destruction, with the effect of inducing not only increased vigour of the functions of the body but an actual augmentation of its weight. Sea air, it is true, acts in the same way, so that it is difficult to determine to what extent improved health results from sea climate or sea baths.

The cold bath is almost universally employed for its tonic virtue. To obtain this wished-for result, the bath should be discontinued at the time it causes general exhilaration, for the system then appears to be roused into action to resist the depressing influence of cold, and if at this point the bath is discontinued the general healthful stimulation persists; for, whilst taking the bath, and probably for some time afterwards, oxidation of the tissues is increased, the blood is purified of effete products, and the processes of construction and destruction of tissue, on which vigour of both mind and body depends, are intensified.

Bathing therefore increases appetite, improves digestion and the assimilation of food. The bath then, is a tonic in the strictest sense of the word.

Used in accordance with the rules to be immediately laid down, the good effect of the bath soon becomes apparent and the patient gains in weight, his complexion becomes ruddy and clearer, his muscles, especially if he conjoins exercise with the baths, acquire firmness and strength, the mental debility arising from deficient nutrition of the nervous system speedily passes away, and he soon recovers mental and bodily vigour.

The important question arises:—How can we best obtain these invigorating effects?

Our object clearly is to secure the greatest possible amount of stimulation, and to ensure as long as possible the persistence of the increased vigour of nutrition. To obtain the greatest degree of stimulation we must duly apportion the temperature and duration of the bath to the patient's strength and to ensure the continuance of nutritive vigour as long as possible, the patient should leave the bath at the climax of general exhilaration and stimulation, avoiding carefully the onset of the next stage, that of depression.

The bather, if very weak, manifests but little functional energy to resist the depression from the cold. Indeed, if this is intense, the stage of stimulation may not come on at all, but, depressed from the first, the patient may so remain for a long time. Injudicious bathing often seriously injures, and even endangers the lives of, weakly persons.

The depressing effects of a cold bath are proportioned to its coldness and duration. The colder the water, the greater depression it occasions, greater, too, when the water is in motion than when at rest. Moreover, the longer the period of immersion the greater is the degree of depression.

When the patient is weak and prostrated by illness, the bath must not be too cold, nor continued too long, and the water should be at rest. Thus, we must have regard to the strength of the patient, the temperature of the water, and the duration of the bath.

Here it will be convenient to consider in what respect sea baths differ from simple water baths and to explain the tonic *superiority* of sea baths.

1st. In sea water various ingredients are held in solution.

2nd. The variations in temperature of sea water, in the varying seasons of the year, are much less than those of river water.

3rd. While the sea is always more or less in motion, river water is comparatively at rest.

The salts in solution are supposed to act as invigorating stimulants to the skin, so that a patient unable to bathe in simple water without suffering great depression, can bathe in sea water with great benefit. Moreover, as the sea's temperature never falls very low in winter, sea-bathing may often be continued late into the autumn, or even into the early winter months.

The motion of the waves increases the depressing effects of the bath, but if the bather is strong enough, it also increases the ensuing reaction; and thus the commotion of the waves, while more bracing to the strong, is at the same time highly exhilarating.

These guiding principles borne in mind, we shall be able under all circumstances to give correct answers to the various questions patients may put to us concerning bathing. One most frequently asked is:—How long shall the bath be continued?

Our answer must be regulated by the strength of the patient and the coldness of the water. If the water is cold, or the patient is very weak, we must at first forbid out-door sea-bathing and substitute a tepid bath the temperature of which should be slowly reduced until that of the sea is reached. Then, if the day is fine and the sea calm, the bath may be taken in the open air. Though it may be considered safe to let the patient bathe in the sea, yet if he is very weak and unaccustomed to bathing, his stay there must be very brief; it will often suffice to allow two or three waves to pass completely over him, when he should at once come ashore and wipe himself thoroughly dry, using plenty of friction to the skin for which purpose Cash's towels are well adapted. With increasing strength and becoming accustomed to the effects of the water, he may continue the bath for a longer time, but it is seldom advisable for a convalescent to bathe longer than from five to ten minutes. Some patients, nay, even some healthy persons, can bear a sea-bath only every other day.

Then as to the time of day best suited for bathing the greatest ignorance prevails, before breakfast being currently believed to be the best time; yet this practice is not without risk even for the robust, who are often made ailing and fatigued by it for the rest of the day.

Our object in using the bath, as we have before said, is to obtain prolonged and energetic stimulation. We must therefore choose that time when the body is most refreshed, invigorated, and nourished. These conditions, it might be supposed would co-exist in the early morning after a sound and refreshing sleep. It must be borne in mind, however, that before breakfast the body has undergone a fast of several hours, and is in want of food, without which the bodily functions may very readily become depressed. In fact only a robust person is able to bear a sea-bath before breakfast.

Thus, theory and practice are both opposed to this period for bathing, both pointing to a time between breakfast and dinner as the most appropriate.

This leads us to the consideration of another question; namely, after a meal, how long a time should pass before a a bath may be taken; and, after a bath, what time should pass before taking food? Now cold bathing produces a great shock to the skin and system generally; and any powerful mental or bodily impression will check or even arrest for a time, many of the functions, even if in active operation. This is the case with digestion. Any great excitement, it is well known, can stay this process more or less completely, and the cold bath is generally sufficient entirely to arrest it; therefore before the bath, an adequate time should elapse so as to permit the almost complete digestion of the breakfast, that is, an interval of about three hours. Nor, for the reason just pointed out, should the bath be taken immediately before a meal; otherwise little or no gastric juice is secreted, and food lies half-digested in the stomach.

And for a reason somewhat similar, the bather should not go into the water whilst under the influence of any great emotional excitement. The nervous force (on which there appears to be set a limit) being directed strongly in one channel, the bath will not produce nervous stimulation, so that the patient will feel languid, cold, shivering, and depressed. Obviously for the same reason children must be coaxed, not dragged into the water against their will. In early life there is often much terror of bathing;

and if in spite of this, the child, while screaming with fright, is forcibly dragged into the sea, very ill effects may follow; for missing the stage of stimulation, the child may remain, often for days, depressed and ill.

Is there any age rendering sea-bathing dangerous, and to be prohibited?

It is generally accepted that young children,—say under two years of age—being very impressionable, ought not to undergo the shock of a cold-sea bath. At the other extreme of life, when the enfeebled powers of the body are incapable of strong reaction, sea-bathing is inadmissible, for it is well known that in old people the heat-forming force is much reduced. Moreover, undue vascular excitement may prove dangerous; the vessels in the aged, often brittle through degeneration, are in danger of giving way, and thus under any unusual strain causing apoplexy.

The foregoing remarks imply that fatigue is a condition strongly adverse to cold bathing. Even if other conditions are favourable, it is seldom advisable, for weakly persons to take a bath on the day following their arrival at the sea-side. They should wait till all fatigue has passed away.

Does pregnancy forbid sea-bathing?

If a woman has miscarried or aborted, or if of an excitable temperament baths may be expected to do harm; and in far advanced pregnancy a sea-bath may perhaps produce abortion. But under other circumstances, and with due regard to the conditions previously laid down, bathing will benefit both mother and child. Nor, if accustomed to the practice, need a woman discontinue bathing at the menstrual period, although it is always inadvisable to begin at such a time, since the shock may check or arrest the secretion, and thus induce perhaps many months of amenorrhœa.

In the choice of coast, and the time of year, we must have regard to the condition of the patient. If not very weak, with the health only a little undermined, then a rugged coast, where the sea is rough and boisterous, should be recommended. However, should the health be much broken, then a smooth sea is preferable, and, in a cold climate, the summer is the only suitable time.

Exercise taken while bathing soon induces fatigue and even exhaustion; wherefore weakly patients must be cautioned to be moderate in this respect. Another evil should be guarded against: on leaving the bath, a patient invigorated by it, is in danger of taking too much exercise, fatiguing himself, and so counteracting the bath's good effect. The amount of exertion permitted must be strictly in accordance with the patient's condition, who, if very weak, should take only horse or carriage exercise.

A course of sea-bathing, sometimes causes the hair to fall off abundantly, naturally exciting much anxiety, especially in women. Their fears, however, may be quieted by the assurance of a rapid new growth. Other troubles may arise. Bathing sometimes induces constipation, more or less obstinate; but this need not lead to the discontinuance of the bath. The constipation should be removed by exercise, regulated diet, or, these failing, by purgatives. Dyspepsia, and diarrhœa, also sometimes occur during sea-bathing. The bather should be discreet, as to the hour of the bath, the time spent therein, and if notwithstanding every care, dyspepsia, or diarrhœa continues, the bath must be temporarily or permanently discontinued. In fact, sea-air alone, will, in some constitutions, induce these disorders.

Restlessness at night is sometimes attributed to sea-bathing. Many people, no doubt, find that living too near the sea-shore often produces broken, or sleepless nights. On the shores of the Mediterranean, especially along the Riviera, this is notably the case. On removal inland, a mile or thereabouts, this restlessness vanishes; for instance, sleep unattainable at Cannes itself, is secured at Cannet, a mile or so inland. Broken rest may often be traced to dietetic irregularities, or to late hours. A late and heavy meal will sometimes cause restlessness, whilst a good night will follow an early, light, and digestible repast. Some patients mar their rest by taking stimulants shortly before bed-time, while, on the other hand, others cannot sleep without a "nightcap."

A bather should plunge into the water at once, and on no account stand undressed and hesitating till he becomes cold and shiver. It is a common and pernicious error to suppose that it is necessary to be well cooled down before plunging into the bath. If needful, a short brisk walk should be taken just before the bath, to warm the surface and extremities.

The effect of cold is, in proportion to its degree, to lessen the perspiration. A cold bath, at first checks perspiration, but soon afterwards this secretion becomes considerably augmented, and in a greater degree after sea than after simple water-bathing. Driven from the skin, the blood flows into and fills the internal organs, and the kidneys partaking of this congested state, probably explains the frequent and transitory occurrence of a small quantity of albumen in the urine, during the bath.

The effects of cold baths on tissue change have already been pointed out, and the observations on this subject will be supplemented and confirmed in those we have now to make relating to the influence of sea baths on the constituents of the urine. Baths augment the quantity of urea and sulphuric acid of the urine. Whether this increase exceeds the limits of the natural healthy variations, and whether the experiments are sufficiently numerous to prove it, has been called in question. It is not to be expected that the tissue change would at once be greatly augmented, nor that the increase at any time would exceed the maximum amount of health; consequently the increase of urea in its turn would not exceed the maximum quantity excreted in health. But surely, if for some time the excretion of urea is maintained at its maximum, this single fact would alone establish the influence of baths, so far as they could be expected to operate, and would show that sea-bathing increases disintegration of the nitrogenous tissues.

The effect of sea-baths to promote tissue change, and to increase the separation of urea by the kidneys, may be also demonstrated in another way.

The increased consumption of food induced by the use of cold baths must be stored up either in the body or be separated from it by the kidneys as urea. Now although the weight of the bather undoubtedly increases, still this augmentation is not commensurate with the increase of ingested nitrogenous matters; there must be, therefore, under these circumstances, an additional separation of urea by the kidneys; but if the prevalent idea is correct, that all nitrogenous matters must first be transformed into tissue before their disintegration and reduction to urea, it follows that sea-bathing likewise promotes tissue change.

Beneke's observations lead to the same conclusion. When food was taken, just sufficient to maintain the weight of the body at a fixed point, he found that baths immediately reduced the weight of the body, a loss certainly due to heightened disintegration of the tissues. But this increased consumption of the tissues being accompanied by increased appetite, and by increased assimilation, more food was taken and his body gained in weight. Baths, it is said, increase the quantity of uric acid, although this is lessened by sea air; but on this point observations are as yet insufficient.

The urinary water is temporarily and often greatly increased though the whole day's urine is lessened in quantity, probably owing to the subsequent excessive elimination by the skin. In Beneke's observation the intestinal secretions were also large, so some water may have escaped in this way.

It is scarcely necessary to occupy much space with a narration of the cases likely to derive benefit from sea-bathing. In chronic illness attended by debility, sea-bathing yields the best results; but it is especially useful to those recovering from acute diseases and to persons whose health has been broken by overwork, by residence in towns, by sedentary employment, or by injurious excesses. It is a question of much importance whether phthisical persons should take sea baths, and our answer must be qualified by the circumstances of the case. When the disease is chronic, with little or no elevation of temperature (little or no fever), when indeed the case is one of fibroid degeneration of the lungs, without active deposition of tubercle or scrofulous pneumonia, sea baths may be permitted, due regard being paid to the rules just laid down.

ON PACKING WITH THE WET SHEET.

Packing with the cold wet sheet, although at present but seldom employed outside hydropathic establishments, is undoubtedly, in many diseases, a very efficacious treatment.

Dr. Johnson, in his work on hydropathy, directs the patient to be placed on a mattress with a pillow to support his head; then "upon the mattress, and extending over the pillow, two blankets are spread, and over this a sheet wrung out as dry as possible with cold water. The patient lies down on his back, perfectly unclothed, with his head comfortably placed on the pillow; an attendant now approaches, say on the patient's left, and first puckering the blanket from the back of the head down to the back of the neck, reaches across his chest, siezes the right upper corners of the blanket, and brings them tightly across under the chin to his own side (the left), and tucks them well and evenly under the left shoulder, where it joins the root of the neck, and under the point of the same shoulder. He now reaches across the body again, and brings over all the rest of the right sides of the blankets to the left side of the patient, and then proceeds to tuck them well and evenly under the left side, beginning where he left off, at the point of the left shoulder, and proceeding quite down to the heels. The patient is now entirely enveloped in one half of the blankets, and the attendant finishes the operation by passing over to the right side of the patient, and then proceeding to tuck the left sides of the blanket under the right side precisely in the same manner, as we have seen him tuck the right sides of the blanket under the left side of the patient. The attendant, standing on the right side of the patient's legs finally insinuates his left hand under the backs of the ankles, lifts them up, and then with his right hand turns back the lower ends of the blankets under the heels." The wet sheet should reach to the ankles, and "be wide enough to overlap in front of the body about eight or twelve inches; over the whole, four or five blankets are placed, and pressed down close to the sides."

This pack is useful in specific fevers and acute inflammatory diseases. It has long been employed in scarlet fever, and should be used from the beginning and throughout its course. In moderate attacks it is sufficient to pack the patient from thirty to fifty minutes; but if the fever is very high, if the rash comes out slowly, imperfectly, and of a dull colour, if the patient is restless and wandering, the packing must be continued an hour or longer, and be repeated three or four times a day. This treatment developes the rash, greatly reduces the fever, quiets the pulse, renders the skin moist and comfortable, and abates the restlessness and wandering. A short time after the application of the wet sheet, a patient, previously restless and wandering, commonly falls into a quiet refreshing sleep, and awakes calm and free from delirium. Its influence on the pulse and temperature is striking; the pulse in a few hours falling fifteen to twenty beats in the minute; a repetition of the packing greatly reduces the fever. The packing is especially indicated on suppression or recession of the rash, when serious symptoms are apt to arise; the cold sheet will then bring out a brilliant rash, followed, generally, by immediate improvement in the patient's condition. It has been recommended to dash two or three pailfuls of cold water over the patient after each packing. During the whole course of the fever a cold wet compress, renewed every three hours, should be worn round the throat; and if, on the decline of the fever, the tonsils remain large, or there is chronic inflammation of the fauces or larynx, this application, renewed less frequently, or applied only at night, should be continued till these morbid conditions cease. The compress should be composed of linen several times folded, and fastened round the throat by another piece of folded dry linen. Cold packing is beneficially employed in other fevers and in acute inflammations, as measles, small-pox, pneumonia, pleurisy, rheumatism, and gout.

In acute rheumatism, when the pain forbids the patient to be moved, the front of the body only should be packed, and a wet cold compress, renewed every two or three hours, should be wrapped round each of the painful joints. If the prejudices of the patient's friends prevent the use of the cold sheet, the body should be sponged with tepid or cold water several times a day, and if the perspiration is abundant and foul, soap should be used. In addition to sponging, the wet cold compress, as previously described, should be applied to the painful joints. There can be no question of the superiority of this treatment over that of swathing the patient in flannel clothes and covering him with blankets to make him sweat. To avoid the supposed danger of catching cold these woollen clothes are worn day after day, till, saturated with putrefying perspiration, the stench sickens and de-appetizes the patient, and a crop of irritating miliary vesicles is engendered, which breaks the patient's sleep.

In pneumonia some pack the chest only, and renew the cold applications hourly, or even oftener; a mode of treatment which is said to remove the pain, quiet the pulse, calm the breathing, and reduce the fever.

When, as often happens, the patient's friends object to the cold packing through fear of "inflammation" or of "turning the disease inwards," the sheet may be wrung out in tepid water, and by the time it is spread for the reception of the patient, it will be sufficiently cooled to answer the purpose.

A pedestrian after great exertion will find it an agreeable restorative, preventing stiffness and aching of the muscles, to strip and wrap himself in a dripping wet cold sheet, well rubbing himself afterwards; but if stiffness still remains a few drops of tincture of arnica taken internally will remove it.

Cold or tepid packing is useful in the summer diarrhœa of children.

THE INFLUENCE OF COLD BATHS IN FEVERS.

The elaborate investigations regarding the action of cold applications in fevers made during the last fifteen years in Germany induce me to devote a separate chapter to this important subject.

These investigations confirm the conclusions of Currie and Jackson, and give precision to our knowledge concerning the employment and effects of cold to the surface. This treatment has been employed in typhus, typhoid, and scarlet fevers, measles, and other febrile diseases. More recently, Dr. Wilson Fox and others have cured patients suffering from the hyperpyrexia occasionally observed in rheumatic fever, a condition, owing to its sudden onset and rapid course, hitherto regarded as almost necessarily fatal.

Many of the symptoms, and therefore the dangers, of fevers depend in great measure on the elevation of the temperature. This increase of temperature affects the organs in a two-fold manner; in the first place it depresses, or if the rise is very high abolishes function; and in the second place, produces fatty degeneration, or, as it is termed, parenchymatous degeneration of all the tissues.

Fatty degeneration of the tissue sets in during the progress of a fever especially when prolonged. This degeneration has been observed more particularly and fully in the liver, kidneys, heart, blood-vessels and voluntary muscles. This fatty degeneration is in all probability due to the fever, for the degree and extent of the changes correspond in amount to the degree and duration of the elevation of temperature; and similar changes occur where the temperature of an animal is raised by keeping it in a warm chamber. The cells of the liver and kidneys become cloudy, then granular, till the nucleus becomes obscured, and the entire cell distended with granules and in the case of the liver the cells contain an excess of fat; ultimately many cells burst and perish.

The muscular tissue of the heart and of the voluntary muscles becomes granular, then fatty, and in severe cases their fibres undergo extensive destruction.

These effects of high temperature, the symptoms and the deteriorating changes, can obviously be combated only by means which either lower or prevent the undue development of body-heat. Foremost amongst these means must rank cold baths. Employed early enough they obviate the immediate depressing effect of the temperature on the tissues, and prevent the oncoming of parenchymatous degeneration. Thus they reduce the frequency of the pulse, strengthen the heart and so avert danger from failure of the heart and from hypostatic congestion. They tend likewise to prevent delirium and to produce sound and refreshing sleep; to improve digestion and assimilation, and to promote the general nutrition of the body, and thus to ward off or to lessen the risk of bed sores and exhausting suppuration. The period of convalescence, though some deny this, is shortened by promoting assimilation, and thus preventing parenchymatous degeneration. It is true that the specific poison of some fevers, as typhoid and typhus will itself probably in some degree affect the heart, brain and functions generally: but that the depression of the heart and brain is mainly due to the elevated temperature is shown by the great abatement of the symptoms referable to these organs when the temperature is reduced; though, indeed, it may be plausibly urged that without elevation of temperature, the specific poison cannot be formed, and hence, anti-pyretic treatment will likewise obviate its depressing effects.

Cold bathing is applied in various ways, by means of the general cold bath, affusion, packing, sponging, and by the use of ice.

Brand, to whom the revival of this hydropathic treatment is chiefly due, has employed it largely in typhoid fever. In mild cases he uses cold wet compresses, or frequent washing with cold water, or repeated packings in a cold wet sheet, or a warm bath gradually cooled. In severe cases he recommends affusion, the shower bath, or the general cold bath. He generally places the patient in a sitz-bath and pours water of 50° to 55° Fah. over his head and shoulders for ten or fifteen minutes, wraps him afterwards unwiped in a sheet and covers him over with a coverlet, and applies to his chest and stomach compresses wrung out of iced water, but if the patient complains of cold he covers the feet more warmly or applies hot bottles to them.

Hagenbach employs a general cold bath of 68° to 77° Fah. for ten to twenty minutes, and if there is much delirium, or coma, he at the same time pours cold water over the patient's head. He disapproves the frequent cold washings and packings, asserting that they abstract but little heat and fatigue the patient.

The method employed by Ziemssen and Immerman is the most agreeable to the patient, and being equally efficient it is the treatment most likely to be generally adopted. They immerse a patient in a bath of 95°, and in the course of twenty to thirty minutes, gradually cool it to 60° Fah. by the addition of cold water. This bath is agreeable to fever patients. These observers do not employ affusion, since the patient much dislikes it, nor cold compresses, since these do not affect the rectal temperature. Cold packings they find, however, do reduce the temperature of the rectum. For young children and old persons the severity of the application must be apportioned to the strength of the patient. Brand wraps a child in a wet sheet, and placing it on a table pours cold water over its head. For children and the aged, Hagenbach employs for half an hour a warm bath gradually cooled by the addition of cold water to 86° or 75° Fah. Weakly patients should be well rubbed on leaving the bath. Hagenbach adopts this treatment whenever the temperature rises above 102° Fah., while Brand recommends it whenever the temperature mounts above 103° Fah.

The repetition of these processes must be regulated by the subsequent course of the fever. If in three or four hours the temperature again rises to 103° Brand repeats the affusion. In most cases he finds that six affusions are enough, and afterwards he applies cold cloths wrung out of water at 60° Fah. two or three times a day; these applications, provided the temperature does not rise higher than 100° Fah., being made smaller and applied less frequently as the case progresses. In very severe cases the affusion must be employed every two hours. When the patient is comatose, and the foregoing treatment fails to restore consciousness, Brand applies a cold affusion of 45° Fah. to the head every half hour.

Dr. Stöhr recommends the continuance of this treatment in typhoid fever, to the middle of the third week; but it may be required longer, and here the thermometer is the test.

Ziemssen and Immerman find that with their plan four or five baths are necessary the first day and that subsequently two or three daily will suffice, the repetition, however, being regulated by the information afforded by the thermometer. They prescribe the bath at 6 a.m., 1 to 3 p.m., and at 7 p.m. Ziemssen and Immerman found, as might be expected, that in typhoid the degree of cooling and its duration differed according to the patient's age, and the severity of the case. Thus they find the usual reduction is 3·6° Fah. in children, and 2·5° Fah. in adults. In severe adult cases, however, the temperature falls only 1·8° Fah. and the effect of the bath is least evident in cases where the morning remission is slight. In severe infantile cases they found that the temperature recovers its former height in six hours, in adult cases of moderate severity in seven hours, and in severe adult cases in six hours and a half, and in cases with slight morning remissions in three hours.

A single bath often effects a considerable reduction of the febrile temperature. Thus, Mosler reduced the temperature in a case of typhoid 7° Fah., and Dr. Wilson Fox, in one of his interesting cases of rheumatic hyperpyrexia, 12·4° Fah.

Dr. Wilson Fox's exact and continuous observations on some cases of rheumatic hyperpyrexia, add precision to our knowledge of the effects of cold baths. He has shown that the fall of temperature continues even six or more degrees, 40 or 50 minutes after the discontinuance of the bath. It is important, therefore, to observe the temperature in the rectum while the patient is in the bath and to remove him before the heat is too far reduced, lest too great a withdrawal of it might lead to collapse. This indeed appears sometimes to occur, for we read of cases becoming cyanotic, although German observers aver that this is not important and advise in such a case the application of warm bottles to the extremities. Still I am convinced that it is important to avoid depressing to this hazardous extent, as I have seen a child, suffering from scarlet fever, killed by an over-energetic employment of cold.

German observers show conclusively that this treatment greatly reduces the mortality of typhus and typhoid fever. Thus Brand treated 170 cases of typhus, and Bartels treated 30 cases of typhoid without a single death. The mortality of Hagenbach's typhus patients was 5 per cent. provided the cases were treated early, and Dr. Stöhr reduced the mortality of his patients from 30 to 6 per cent., and the results he thinks would have been still more favourable could he have treated some of his cases earlier. Liebermeister lessened his mortality from 27 to 8 per cent. Dr. Wilson Fox and more recently Dr. H. Weber, Dr. Greenhow, Dr. Thompson, and others have shown that we can often cure those very grave cases of rheumatic hyperpyrexia, to which no doubt most of the fatal cases of rheumatism are attributable—an invaluable addition to our knowledge. Admirable as this advance in treatment undoubtedly is, yet unfortunately, it has not proved quite so successful as was at first expected, several patients having died in spite of it.

This treatment not only reduces the excessive heat of fever but it allays the nervous symptoms and limits the wasting, and Brand says it also prevents meteorism, bleeding, and lessens diarrhœa in typhoid. On the other hand, Hagenbach and Jurgensen assert that this treatment does not lessen the meteorism and diarrhœa in typhoid fever nor reduce the size of the spleen, nor the dicrotism of the pulse. All observers agree that cold baths do not shorten the course of typhoid, typhus, and other acute specific fevers, but Brand asserts, while Hagenbach denies, that they shorten the stage of convalescence.

This treatment it is said, rarely, if ever, induces either bronchitis or pneumonia, and the co-existence of either, with a fever does not contra-indicate the use of cold baths.

Ludwig and Schröder find that this treatment of fevers greatly reduces the quantity of carbonic acid exhaled by the lungs, and the solid constituents of the urine, and thus lessens tissue change; a very singular fact, since cold baths, in health, have the very opposite effect. Dr. Fox observes, that sometimes the rectal temperature rises a little, directly the patient is placed in the bath, and Dr. Fiedler and Hartenstein point out that immediately after the bath the axillary is much lower than the rectal temperature, but half an hour afterwards this discrepancy is reversed, the rectal temperature becoming from 1° to 2° Fah. lower than the axillary, and so continuing during three-quarters of an hour.

THE WARM BATH AND THE HOT BATH.

The effects of heat on the body are, of course, for the most part, the opposite of cold. By surrounding the body with a temperature higher than its own the destruction of the tissues by oxidation is considerably diminished. Moreover, experiment has shown that increased heat impedes or destroys the electric currents in the nerves, whence it may be fairly presumed that when subjected to this influence they are less able to conduct impressions either to or from the brain. These two considerations may perhaps account for the enfeebling influence of heat on the body.

The general warm bath, if not too hot, is at first highly pleasurable, but if unduly indulged in throbbing at the heart and in the large vessels, soon comes on, with beating in the head, and a sense of oppression and anxiety. These sensations, however, when perspiration breaks out greatly diminish or altogether cease; but if the bath is continued too long the foregoing uncomfortable sensations return, accompanied by great prostration, even to the extent of fainting; the pulse becomes greatly quickened and enfeebled, while the temperature of the body rises very considerably, and if the heat of the bath is great, may even reach 104° Fah., that is, to a severe fever height.

Warm baths are employed in Bright's disease to increase the perspiration so as to lessen the dropsy, and carry off from the blood any deleterious matter retained in it through the inaction of the kidneys. But discretion must be used, otherwise they will do mischief by reducing the patient's strength, increasing the anæmia, and so actually augmenting that general anasarca, which the bath was employed to remove.

Since a large share of the dropsy of Bright's disease is due more to anæmia, than to the presence in the blood of poisonous excrementitious substances, it is obvious that the injudicious employment of the warm bath, will increase both the weakness and the anæmia, and augment the general dropsy.

In the cases now referred to, warm baths are administered with the hope of passing off by the skin either urea, or the products, which if properly oxidised would form urea, and thus to free the system from poisonous agents. It is doubtful if warm baths can effect this elimination, since it appears to be almost certain that, in health, no nitrogenous substance finds its way from the blood through the skin. Still there can be little doubt that, under certain conditions, these baths often give great relief. If our object is to withdraw poisonous matters from the blood, it is time enough to act when there is reason to suspect their existence; but when there are no symptoms indicative of blood-poisoning, as headache and drowsiness, warm baths are simply harmful.

The general warm bath is of signal service either in simple or inflammatory fever of children. If a child is not very weak, a bath night and morning, for a time varying from five to ten minutes, soothes and quiets, and often brings on refreshing sleep. In the febrile diseases of grown-up people it is generally difficult to employ the general warm bath, but in its stead, sponging with hot water often induces perspiration, calming at the same time the restlessness of the patient, and favouring sleep. The same means will soothe the restlessness of convalescence and induce sleep.

The warm bath mitigates or removes the pain of colic, renal, biliary, or otherwise. Whether its effects in relaxing spasm, are induced through its soothing influence on the skin, or from weakness caused by the bath, is difficult to say; the bath certainly seems to ease the pain before any noticeable weakness is produced. In skin diseases of various kinds the general warm bath is invaluable. In psoriasis, eczema, icthyosis, urticaria, lichen, prurigo, and scabies, it may generally be employed with benefit. It is especially useful in the acute stage of eczema and psoriasis. Rain or boiled water should be used; but if these are not available, the water should be made more soothing by the addition of a small piece of common washing soda, gelatin, bran, or potato-starch. These baths allay inflammation and itching. The body must be dabbed dry with soft towels. If there is much itching, flannel should not be worn, and scratching should be prohibited.

It has been recommended to keep a patient with severe burns immersed for days in the warm bath; this treatment is said to ease pain, diminish suppuration, promote the healing process, and to lessen the contraction of the cicatrix.

Langenbeck asserts, that continuous immersion of the stump in warm water after an amputation will avert pyæmia.

As a means of obviating the various symptoms occurring at the change of life, Dr. Tilt recommends the general warm bath of 90° to 95° Fah. for an hour once a week so as to promote free perspiration.

The local warm bath is used for a variety of purposes. It is hardly necessary to refer to the common household practice of [illegible] water just before going to bed, [illegible] and so relieve catarrh. The hot [illegible] of great service when the menstrua[illegible] present. To this bath mustard [illegible] but, as the late Dr. Graves insist[illegible] be used only at the menstrual [illegible] night and morning, for six days, co[illegible] before the period begins, this must[illegible] to other treatment, and often [illegible]. This sitz-bath is often [illegible] to cold or from other circumst[illegible] suddenly stopped, to the patient's gre[illegible]

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[illegible] AND SPONGE BATHS.

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putting the feet into hot water just before going to bed, to induce general perspiration and so relieve catarrh. The hot foot-bath or the sitz-bath is of great service when the menstrual flow is either deficient or absent. To this bath mustard may be added with advantage; but, as the late Dr. Graves insisted, this stimulating bath should be used only at the menstrual period. Employed nightly, or night and morning, for six days, commencing one or two days before the period begins, this mustard bath is a very useful auxiliary to other treatment, and often succeeds in establishing menstruation. This sitz-bath is often effectual, when through exposure to cold or from other circumstance, the menstrual flow is suddenly stopped, to the patient's great annoyance and suffering.

Dr. Druitt points out that sponging the body with very hot water, will for some hours diminish the excessive perspiration of phthisis.

Hot water to the legs and feet sometimes removes headache, and according to Dr. Graves relieves distressing palpitation.

Sponging the face, temples, and neck with water, as hot as can be borne, often relieves the headache of influenza, catarrh, and other diseases.

The hot-air bath very generally succeeds in promoting free perspiration. If it is difficult thus to establish a free flow of perspiration, the hot-air bath may be preceded by the general warm bath.

Vapour baths are used for the same purpose and are less depressing than the general warm bath. They produce much less elevation of the temperature of the body, a circumstance which probably explains their difference in this respect.

SHOWER, DOUCHE, AND SPONGE BATHS.

The forcible impact of water upon the body, and the impression it makes on the nerves, or, to use the general expression, the shock it produces, is sometimes very great, sufficient sometimes, even with strong and healthy persons, to produce considerable depression and languor lasting hours and occasionally days.

The shower bath is a remedy not much used, patients, ordinarily manifesting great repugnance to it. The sponge bath, or the local douche, may usefully supply its place.

In the sponge-bath we have all the conditions of the common bath. Both are cleansing, bracing, invigorating; and the action of each is identical.

The sponge-bath is often employed not merely for its tonic effects, but on account of the shock it causes to the nervous system.

In the treatment of laryngismus stridulus, cold sponging is more successful than anything else. The practice of confining little children thus affected in a warm close room, sousing them in warm baths several times a day, is positively injurious, and inevitably aggravates the severity and frequency of the crowing breathing. Cold sponging twice or thrice daily, according to the severity of the case, will scarcely ever fail at once to modify the disease, however severe the attack. So prompt is the relief of cold sponging that a child subject to hourly attacks during the day, and to ceaseless attacks at night, is frequently instantaneously delivered from them. At all events, a decided improvement always occurs, and the intervals between the attacks are much prolonged; it rarely happens that the strident crowing resists this treatment more than two or three days. The mother should be directed to keep the child out of doors the greater part of the day, no matter how cold the weather, indeed the colder the better. Laryngismus seldom attacks children more than a year old. At so tender an age it might be feared that they would run great danger of catching cold from the sponging treatment; but no such fears need be entertained. With the necessary precautions even the youngest child may be sponged with perfect safety several times a day. Nor does a child catch cold even in the coldest weather when carried out of doors; but one prone to bronchitis had better be kept indoors when the weather is very severe, and should undergo the cold-water sponging only. After a very extensive experience of this treatment I have rarely found that children suffering from laryngismus catch cold, and in such exceptional cases the catarrhal symptoms have been insignificant. This treatment frequently saves life, and averts not only the crowing breathing but dangerous symptoms such as partial convulsions in the form of carpo-pedal contractions and squinting, for laryngismus when fatal, generally destroys by exciting an attack of general convulsions. Laryngismus stridulus is sometimes accompanied, and is indeed apparently induced by laryngitis, indicated by the peculiar hoarse voice. In such cases cold sponging must be cautiously used, for it often though by no means invariably, increases the laryngitis and therefore the laryngismus. Among the poorer classes, at certain seasons of the year, laryngismus is one of the most common causes of convulsions, which tend so often to a fatal issue.

The surest and speediest way of arresting a paroxysm of crowing breathing is to dash cold water over the child. At the onset of a paroxysm cold water should be dashed on the child's face; and if this does not at once arrest the attack, water should be applied to the whole body. Laryngismus fortunately prevails in the early spring, when the cold weather itself is a ready source of cure. Since by this treatment laryngismus is usually cured at once, or rarely lasts more than a few days, it is obvious that cold water does not act as a mere tonic, although in this respect it is very useful, because laryngismus generally attacks weakly, sickly, and rickety children.

Any irritation aggravates laryngismus, and impedes its cure. Hence, if the relief from cold sponging is less marked than might be expected, some other source of irritation should be sought for and removed. The gums, if swollen, red and hot, must be freely lanced and the cuts maintained open, for if they close the irritation recurs; thus it is necessary to lance the gums every few days. Worms must be removed, and the faulty state of mucous membrane favouring their production treated. At the cutting of each tooth, laryngismus is apt to recur, in spite of cold sponging, but the relapse is seldom severe. When the tension of the gums is removed, and the tooth set free, the fit ceases. Irregularities of the bowels, diarrhœa, constipation, flatulence, &c., tend to increase the frequency of crowing, and to render the case less amenable to cold sponging.

It may here be useful to advert to a condition, not uncommon in infants. An infant in poor health, frequently wakes up at night from "a catch in the breath." From some unexplained reason, it cannot for a time get its breath, and wakes up with a loud snore. This condition is altogether different from that of laryngismus stridulus, and the fault appears to lie in the soft palate, not in the larynx; moreover, it is not due to enlarged tonsils, as this "catch in the breath" occurs in children of tender age, long before the morbid condition of the tonsils takes place. Cold sponging, night and morning, will improve or even cure this curious complaint.

Cold sponging, several times a day, holds also deservedly a very high place in the treatment of chorea. It is at present impossible to decide whether its efficacy is due solely to its tonic properties, or whether the shock plays any part in promoting the cure. Of the value of this treatment, there is no question, yet circumspection must be exercised, or the patient may be made worse. It must be avoided if there is any rheumatism, which is generally made worse by cold sponging, thus inducing an increase of choreac movements. If there is no fever, and no pain in any of the joints, then cold sponging may be reasonably expected to yield most satisfactory results.

In the treatment of rickets, cold sponging, by virtue of its tonic properties, holds a very high place. Here again care must be observed, or much harm may be done. We must remember that a rickety child is often not only very weak, but, on account of its tender years, very impressionable, and for these reasons it is important to adapt the application of the cold sponging to the patient's condition. If the child is old enough to stand, he should be placed up to the ankles in warm water, before a good fire, and then, except the head and face, be sponged all over with cold water from two to five minutes; he should then be carefully wiped dry and well rubbed with a soft towel. If weakly, the child may be replaced for a short time in a warm bed, to encourage reaction. The sponging should be administered as soon as the child leaves his bed; but if very weak or unaccustomed to sponging, it is advisable to give a light and early breakfast about an hour beforehand. There is another excellent method of administering cold sponging to weak persons or to timid children, and therefore, a plan to be adopted when this agent is used in the treatment of chorea. The water, at first tepid, should be gradually reduced in temperature by drawing off the warm water and substituting cold. The shock is thus avoided, whilst the tonic virtue of the bath is obtained. This latter method succeeds admirably with timid children, who, often much frightened by the bathing, sometimes scream so violently as to lead their friends to fear an attack of convulsions.

Cold sponging is very invigorating for adults in impaired health; it is useful also in anæmia, leucorrhœa, amenorrhœa, spermatorrhœa, and in that low nervous state induced by working in hot, close, ill-ventilated rooms.

In cold weather, the water at first should be made a little warm, afterwards the temperature should be daily lowered. The depressing effects on the weak may generally be prevented by a little light food taken about an hour before the bath, and after its completion by a return to bed for half an hour to restore warmth to the skin and extremities.

Affusion and the Douche.—Cold water thus applied impinges on the body with considerable force, and the resulting nervous impression is correspondingly considerable. Water is directed against the body in a full stream, and is applied sometimes to every part of the surface in succession. The depression it produces is too great to admit of its frequent employment. It is generally modified, and the cold affusion used in its place, cold water is dashed in pailfuls over the surface of the body. Affusion is recommended in sunstroke when a patient is struck down and rendered unconscious. Many years ago cold affusion was employed in the treatment of the acute specific fevers, and was especially recommended in scarlet fever,—a well-tried mode of treatment coming down to us sanctioned by the authority of many of the ablest physicians of the past generation. Yet in the present day the reaction against all energetic treatment is so great that this means is now very rarely adopted. Fears are expressed lest serious consequences should ensue; but if the affusion is employed at the right period, no apprehensions need be entertained, as the experience of Currie and Jackson abundantly testify. It should be employed during the early days of the fever, when the skin is hot and the rash bright red.

Currie and Jackson recommended that the patient should be stripped, and that four or five gallons of very cold water should be dashed over him, a process to be repeated again and again when the heat of the surface returned. This treatment diminishes the fever, and sometimes, it is stated, even extinguishes it. (See page 15).

Though a pure digression I avail myself of the opportunity to draw attention to the uncertainty as to the time of the appearance of the rash of measles. It is commonly said that the rash appears on the fourth day and in the main this holds good. But to this statement there are very many exceptions whilst scarlet fever rash either anticipates its proper time or appears punctually on the second day; whilst that of small pox appears on the third; and that of typhus on the fifth day: the rash of measles is very uncertain appearing sometimes on the first, second, third, or fourth day or even later. I had lately abundant opportunity of testing the earliest appearance of the rash in an epidemic of measles, at a large public school for boys under twelve. In every case during this epidemic the rash appeared on the first day, the cases being severe, though of short duration, the temperature rising to 103° and often to 104° Fah. In some instances indeed the rash preceded the fever; thus several of the boys feeling poorly their temperature was carefully taken night and morning under the tongue and in several cases the rash appeared in the morning about the face and collar bones, whilst the temperature remained normal and did not rise till the evening when it ran up to 101,° 103° and even higher.

The opportunity of ascertaining the incubation period of acute specific disease being somewhat infrequent, I am induced to publish the following notes of several cases of measles.

Miss D., joined her family at Ramsgate on April 17th; on the evening of the 18th she felt poorly, and on the 19th a well-marked measle rash appeared. Her brothers and sisters who did not see her on the 19th were immediately sent to their London home. A brother returned to school on May 3rd, and remained quite well till at 1 p.m., on May the 6th a suspicious rash was noticed, though he did not feel at all ill. He was at once sent to the Sanitorium, a mile distant from the school. In the evening a well-marked measle rash appeared on the face and body. The temperature being 103°.

April 18th to May 6th inclusive—19 days.

Miss M., her sister felt poorly May 4th. Rash appeared May 5th—17 days.

Miss Mary, another sister, felt poorly, May 9th. Rash appeared 10th June. April 18th to May 9th, inclusive—22 days.

At the same school Mr. M. felt poorly May 20th, and rash appeared 21st, the temperature being 104·5. May 6th to 20th inclusive—15 days.

The douche and affusion are generally employed for their local effects. They are of the greatest service to rouse a patient from the stupor of drunkenness, or from that of opium poisoning; when a certain stage of the poisoning has been reached no other treatment is so efficacious. Excessive tippling or an over dose of opium induces stupor more or less profound, when the movements of respiration, at first languidly performed, soon stop, and death by asphyxia results. At this most critical stage, cold affusion, or the cold douche, applied freely to the head, is generally sufficient to remove the conditions within the skull on which the stupor depends. Consciousness is restored, the breathing simultaneously again becomes natural, and for a time at least, the fear of a speedily fatal termination is set at rest. The water should be poured on the head from a good height, so as to secure as great a shock as possible. The vigour of the application must be regulated by the pulse and general state of the patient. The breathing becomes deeper and more frequent, the livid, bloated aspect of the face soon disappears, while the pulse grows in strength. It often happens, that relapses occur, when the affusion must be again and again employed, so as to sustain life long enough to admit of the elimination of the poison. If promptly and efficiently applied, life may be saved even in the most unpromising cases. It is all important to ply the water abundantly for some time, and from a good height. Some time may elapse before any good effects become visible, but if the pulse and breathing improve, or become no worse than before the douche was tried, its application should be continued, and perseverance will often be rewarded by success.

Many cases of furious maniacal delirium may be quieted by the cold douche. It must be borne in mind that the douche is a powerful remedy, which makes it necessary to carefully watch its effect on the patient's strength. To obviate excessive depression, it is an excellent method to place the patient in a warm bath, and to apply cold to the head in the manner just described.

Severe pain in the head, met with in acute specific fevers, or resulting from gastric disturbance, may be relieved very gratefully and effectually in the way recommended by Dr. Hughes Bennett: "A washhand-basin should be placed under the ear, and the head allowed to fall over the vessel, by bending the neck over the edge; then a stream of cold water should be poured from an ewer gently over the forehead, and so directed that it may be collected in the basin. It should be continued as long as agreeable, and be repeated frequently. The hair, if long, should be allowed to fall into the cold water, and to draw it up by capillary attraction." The ice-bag may be conveniently substituted for this application. Dr. Hughes Bennett agrees with Graves, that in some cases very hot water acts more successfully than cold.

The cold douche is also an excellent local tonic to individual parts of the body. It may be employed to remove that stiffness in joints remaining after slight injuries, or resulting from rheumatism or gout, and salt may advantageously be added to the water. The force of the douche's impact on the affected part, with the duration of its application, must be regulated by the condition of the tissues. If very weak, it is better at first to play the water in the neighbourhood of the injured or weakened joint. Much good may be effected in spermatorrhœa by the free application of cold water to the perinæum and buttocks several times a day, and by the suspension of the testicles in cold water for a few minutes night and morning. The same treatment is useful in varicocele. Dr. Fuller recommends the cold douche to be played for one or two minutes upon joints affected with rheumatic arthritis or the water may be slightly warmed in winter, and then the parts rubbed till they are warm and dry.

Vaginal injections of cold water, about 60°, night and morning are sometimes useful to prevent the recurrence of leucorrhœa after it has been checked by appropriate treatment; though it must be borne in mind that some women are intolerant of cold vaginal injections. A cold water injection of about half a pint every morning before going to stool relieves or cures piles in many cases, and is always a useful addition to other treatment. Many persons, especially women, are troubled with cold feet, particularly at night, so cold indeed, as to effectually prevent sleep for hours. This condition which may rank as a distinct ailment is best treated by immersing the feet nightly, for a few minutes in cold water, rubbing them whilst in the foot-bath diligently until they become warm and glowing, and then after thorough drying, clothing them in thick overlarge woollen or "fleecy hosiery" socks.

THE TURKISH BATH.

This bracing and depurating bath combines many of the properties of the hot and cold bath. The body, subjected to great heat, is made to perspire copiously. If the bath ended here, more or less weakness would ensue; but at this stage the free application of cold water stimulates and braces the body, and produces the tonic effects of the cold bath. At each stage of the process, the Turkish bath cleanses the system; the perspiration carrying off, and the cold consuming, by increased oxidation, many effete and noxious substances in the blood.

The baths, says Dr. Goolden, are useful in gout, rheumatism, sciatica, Bright's disease, eczema, and psoriasis; they benefit bronchitis, the cough of phthisis, the aching of muscles from unusual exertion, pains in the seat of old wounds, colds in the head, quinsies, and common winter coughs.

It is not amiss here to caution persons prone to colds, that the habit of over-clothing increases this liability. This cold-catching tendency may be obviated by using a moderate amount of clothing, taking a cold sponge bath every morning, an occasional wet-sheet packing, or the Turkish bath once or twice a week.

On catching cold a patient with lungs previously healthy becomes troubled for some time with chronic catarrh, accompanied by considerable expectoration and some shortness and oppression of breathing. In such a case the Turkish bath generally affords prompt and great relief, checking the expectoration and easing the breathing. In bronchial asthma and emphysematous asthma, a course of Turkish baths, say one every second or third day, is very useful; this subdues chronic bronchitis and renders the patient less liable to catch cold. A large Chamois leather waistcoat reaching low down the body and arms, and worn over the flannel, affords great relief in bronchial asthma and emphysematous bronchitis. This jacket is extremely warm and protects the chest against the vicissitudes of weather. It is a nasty practice to wear it next the skin.

At the commencement of a feverish cold, a Turkish bath will cut the attack short, remove the aching pains, and relieve or cure the hoarseness at once. The bath will still prove very useful for a cold of several days standing, though its good effects are less striking. The Turkish bath will relieve or carry off the remains of a general severe cold, as hoarseness, cough with expectoration, and lassitude. Whilst in the hot chamber the voice generally becomes quite clear and natural, though the hoarseness may afterwards return in a slight degree; but it usually continues to improve becoming natural in a day or two, a repetition of the bath aiding complete recovery. In more obstinate cases several baths may be required. Great improvement of the voice in the hot chamber may be taken as proof that the bath will benefit, even though, after the bath, the hoarseness returns to a great extent.

The Turkish bath is serviceable to persons who after dining out, not wisely but too well, suffer next day from malaise and slight indigestion. A course of Turkish baths is very beneficial to town-dwellers leading a sedentary life, who, especially if they live freely are apt to become stout with soft and flabby tissues, are easily tired, suffer from lack of energy and some mental depression. Under the influence of the bath, their muscles become firmer, the fatness decreases, and they acquire more spirit and energy.

A course of Turkish baths is useful to patients whose health has broken down by residence in a tropical climate, who suffer from general debility, enfeeblement of mind, dull aching pains in the head and broken sleep. I have heard the Turkish bath, even its daily use, recommended highly for convalescents from acute diseases, to promote assimilation, digestion and appetite. Patients suffering from jaundice, acquired in a tropical climate or from malaria, have often testified to the beneficial effects of Turkish baths: but it is necessary, as indeed it is with all persons with shattered health, to caution them against the too vigorous and unrestrained use of the bath. The patient should leave the hot chamber as soon as free perspiration occurs, and should not plunge into the cold bath, but take a douche with slightly tepid water, especially in cold weather.

Many dread the Turkish bath lest they should catch cold, and one often hears complaints of a cold coming on after a bath. So far from tending to give cold, these baths, as we have said, obviate the tendency to catarrh, and fortify delicate persons with a cold-catching tendency. If ever the bath is answerable for a cold, it is almost always owing to the bather leaving the bath house too soon, perhaps in inclement weather, whilst his skin is still perspiring freely, or his hair is soaking wet.

Again, it is not unusual to hear complaints that the bath has induced considerable depression, or even exhaustion, lasting perhaps several days; but here again, the fault rests with the bather. The bath must be adapted to the strength of the patient, and it is always prudent to take the first bath circumspectly, the bather not staying too long in the hot chamber, and undergoing the bracing application only a few seconds, with water not very cold. It is difficult to point out the precise time a bather ought to remain in the hot chamber. If delicate, and it is his first bath he should not enter a chamber hotter than 130° to 140° Fah., and should stay there only twenty minutes or half an hour, or less, should he feel faint or tired. The patient's sensations are the best guide; sometimes especially if suffering from pain, the bath soothes and eases, and then he can remain in the hot chamber an hour, the first bath; but I repeat he should at once leave when he feels faint or tired. At first, the patient, not seldom, on commencing the bath, fails to perspire, in this case, he should be removed from the chamber in ten minutes, have warm water poured over him, and be well shampooed, and unless he is tired or faint should then return to the hot chamber. It is a rule in these establishments to advise even an old bather not to enter the hotter chamber of 180° to 220° Fah., till the skin has become moist with perspiration; though many disregard this injunction with apparent impunity. Even if the first bath causes some depression, this need not happen afterwards, partly because the bather will have become accustomed to the process, and partly because he will know how to adapt it to his strength. Yet it must be admitted that some persons, even with every precaution, cannot take a Turkish bath without experiencing much depression.

Acute rheumatism and acute gout have been treated with these baths; but, as in most instances, the severity of the pain renders it impracticable to take patients thus affected to a Turkish bath, a modified substitute for it, shortly to be described, may be taken at home. The acute pain of gout, it is said, disappears in the hot chamber, to return soon afterwards in a diminished degree.

The Turkish bath is particularly valuable, in sub-acute and chronic gout, but, as might be expected, it is not in all cases equally serviceable. In long-standing cases, in which the attacks have occurred so frequently as to distort the joints by deposits, and patients are perhaps liable to repeated relapses, and are scarcely ever free from pain, the efficacy of the bath, though striking, is less apparent than in milder and more tractable forms; yet even in these severe cases, the bath affords considerable relief, by diminishing the frequency and severity of the relapses, and by removing the pervading sensation of invalidism. The Turkish bath is perhaps more efficacious than other remedies in a case of the following kind:—A patient inclined to stoutness, complains of slight and fugitive pains; the joints, but little swollen, are merely stiff and a little red and hot. The gout affects many parts, often in succession—the joints, the head, the back, and perhaps some of the internal organs, as the bladder, etc. During an attack the patient complains of *malaise*, and his complexion often becomes dullish. The tissues are often soft and flabby, and in spite of judicious diet and abundant exercise, the patient may be seldom free from some evidence of gout, sufficient to annoy but not to disable him for work.

After one or two baths the pains, the swelling, and the *malaise*, disappear, the joints become supple, and after a time, the baths being continued, the complexion loses its sallowness, the tissues become firm, and the undue stoutness undergoes diminution. On discontinuing the baths, the gouty symptoms will often recur, again to disappear on the resumption of the treatment. A gouty patient may advantageously supplement the action of the Turkish bath by drinking certain suitable natural mineral waters.

The Turkish bath is useful in the various kinds of chronic rheumatism.

A patient who, in damp weather, or during an east or north east wind, suffers from stiffness and pains in several joints, will derive much benefit from a Turkish bath. The shoulder joint is often affected, the pain and tenderness being frequently limited to a small spot.

Again, a patient without any previous history of rheumatism finds his shoulder set fast, is unable to move it except to a limited extent, without great pain. Here again the pain and tenderness may be very circumscribed. In such a case a Turkish bath generally affords great relief. Galvanism too, even one application, will often entirely remove or greatly lessen the pains and stiffness. Again the Turkish bath gives much relief in mild and chronic rheumatoid arthritis, and often retards the march of this disease. The bath often relieves lumbago.

Mr. Milton finds the bath useful in allaying the tormenting itching of prurigo unconnected with lice.

Should it happen that the regular Turkish bath is not available then one or other of the following modifications of it may be substituted :—the patient, quite naked, seated on a wicker chair, with his feet on a low stool, is enveloped in two or three blankets, the head alone being exposed, and a spirit-lamp with a large wick is placed under the chair. In about a quarter of an hour perspiration streams down the body, and this secretion may be increased by drinking plentifully of water, and by placing a pan of water over the lamp. When the patient has perspired sufficiently, the blankets are quickly removed, and one or two pailfuls of cold water are poured over him; or if this affusion is too heroic, he may step into a general bath at 80,° or better still a few degrees lower. Dr. Taylor, of Nottingham, finds this treatment useful in obstinate skin affections, rheumatism, catarrh, syphilis, and in reducing stoutness arising from an inactive life. The instrument makers now supply convenient forms of the domestic Turkish bath. It is far better, however, when practicable to employ the Turkish bath itself.

Dr. Nevins highly recommends the following handy steam bath in the treatment of acute rheumatism, available when the patient is lying helpless and irremovable in bed:—A couple of common red bricks are placed in an oven hot enough for baking bread, and in half an hour or a little more they are sufficiently heated for the purpose. The patient's body linen having been previously removed, these two bricks are folded up in a piece of common thick flannel, thoroughly soaked in vinegar, and laid on two plates; one is to be placed about a foot distant from one shoulder, and the other about equally distant from the opposite leg, and the bed clothes are then to cover the bricks and the patient closely round the neck. A most refreshing acid steam bath is thus obtained; and the supply of steam may be kept up, if necessary, by removing one brick and replacing it by another hot one kept in reserve. When the patient has been in the bath for fifteen or twenty minutes, the bed clothes and plates should be removed, and *the patient instantly mopped all over, very rapidly, with a towel rung out in cold water*, and then quickly rubbed dry. Dry warm linen must be put on at once, and dry bed-clothes must replace those which were on the bed previously. The under-sheet can be removed, and a dry one substituted, by fastening the corners of the dry sheet to those of the damp one; generally very little difficulty is met with in simply drawing the old sheet from under the patient, when the dry one follows it, and is left in its place. The patient ordinarily experiences great and speedy relief from this bath. The exhausting sweats are usually diminished, and the necessity of opium much lessened. The change of the body linen can be easily acomplished by tearing the night shirt open from top to bottom, down the back. The steam bath and subsequent cold douche should be continued after the patient is able to walk about, as they contribute to the healthy action of the skin, and promote free mobility of the joints. After the patient is able to get out of bed, the bath may be administered in the manner previously described. The steam bath according to Dr. Sieveking relieves the pain and checks the perspiration in acute rheumatism to a degree he has failed to attain by any other treatment.

POULTICES AND FOMENTATIONS.

POULTICES and fomentations, in such common use, are simply local baths applied to the skin. When its surface or the structures beneath it are inflamed, poultices and fomentations are a convenient and efficacious means of utilizing warmth and moisture in the treatment of diseased parts. The warmth and moisture relax the tissues, and in some degree abate the tension due to inflammation, and so relieve pain. Applied at the very beginning to inflamed tissues, to abscesses, inflamed pimples, and the like, poultices often summarily check the inflammation and prevent the formation of pus. Fomentations with water as hot as can be endured also arrest inflammation and check the formation of matter, and should be generally employed as adjuncts to poultices. Hot fomentations will often disperse or restrict the development of acne indurata, herpes labialis, and similar inflamed pimples, apt to appear on the face.

These applications are of further use when suppuration has set in and matter requires to be expelled. Poultices greatly facilitate the passage of the matter to the surface and further its expulsion, while, at the same time, they limit considerably the spread of inflammation in all directions. Here again, very hot fomentations often repeated, continued for some time, are a useful supplement to poultices.

It should be remembered that much depends on the heat of the application. Poultices should be always applied as hot as they can be borne, and should be frequently changed, lest they become cold and hard. Indeed, they can scarcely be changed too often; in hospital practice it is difficult to constantly renew poultices; yet even in such institutions, where the supply of nurses is limited, poultices should be changed at least every two or three hours.

When applied to disperse inflammation or to hasten the maturation of abscesses, the poultice should be large, reaching beyond the limit of the inflamed tissues; but as soon as the abscess or boil has matured and burst, the poultice should be very little larger than the opening in the skin through which the matter escapes. A large poultice applied over-long, soddens and irritates the skin, and is very liable to produce an eruption of eczema, or to develop fresh boils around the base of the original one.

In the treatment of boils, carbuncles, abscesses, and inflamed lymphatics, it is an excellent plan to smear over the inflamed tissues a compound of equal parts of extract of belladonna and glycerine, and on this dressing, to superimpose a poultice. The belladonna eases pain and reduces inflammation. (See Sulphides).

In order to protect the adjacent tissues from the undue action of the poultice, so as to check the production of fresh boils, it is a good plan to place over the boil a piece of opium plaster with a circular hole, and to apply the poultice only over the plaster. Another protective plan is to smear the contiguous surface with zinc ointment.

It is far better to treat a fully developed abscess, ready to be opened, by Lister's carbolic acid method than by poultices.

Poultices moderate the inflammation and alleviate the pain in skin diseases, as eczema, etc., when the skin is highly inflamed, painful, red, and swollen.

Poultices are not only soothing when in direct contact with inflamed tissues, but they appear to act in the same manner on deep-seated parts. Large poultices applied very hot and removed as soon as they become cool, are of great service in pneumonia, pleurisy, bronchitis, pericarditis, peritonitis, etc. To avoid exposure of the warm, moist skin, the old poultice should not be removed till the new one is ready to replace it.

These applications are extremely useful to children attacked with bronchitis, broncho-pneumonia, or lobular pneumonia. As young children are apt to be restless, and to toss about in bed, the entire chest should be enveloped in a jacket-poultice. The ordinary poultice soon becomes rucked up, and converted into a narrow band encircling only a very limited portion of the chest, whilst the uncovered part of the chest is exposed to cold. The jacket-poultice should be constructed with a piece of linen sufficiently large to go quite round the chest, and tapes should be sewn to it in such a manner that they can be tied in front, and over each shoulder. It is as well to have three pairs of tapes so as to admit of three fastening down the front of the chest.

To enable a poultice to retain its heat, it should be spread an inch or more thick, or it may be made thinner, and externally coated with a layer of cotton-wool. The cotton wool being light, it does not hamper the breathing—a matter of importance, especially with children.

In inflammation of deep-seated organs, the same methods, modified to suit the part, should be adopted. In peritonitis it is of great importance to spread the poultice thin and cover it with a layer of cotton-wool; if heavy it aggravates the pain.

Poultices are useful in acute rheumatism, lumbago, sciatica, pleurodynia, myalgia, and in those so-called rheumatic pains which often attack limited parts of the body, as one arm, etc.* They are soothing and pleasant to the inflamed joints in rheumatic fever, although cotton wool is often preferred. In acute lumbago, poulticing often brings speedy relief, the severest cases being greatly benefited in a few hours, and generally cured in one or two days. The poultice must be very hot and large enough to cover the whole loins or part affected, and thick enough to remain quite hot for half an hour, when it must be changed. If the pain is persistent this treatment should be continued for three hours, or longer; the skin must then be covered with a piece of flannel, and the flannel covered with oil-silk; this after-treatment, promotes what is most desirable, free perspiration.

When electricity, the needle, or poultices, fail to give more than slight temporary relief, it will often be found that the lumbago is accompanied with high fever, being sometimes the first symptom of an attack of rheumatic fever.

Sciatica may be treated in the same way, but the result is not often so satisfactory. (*Vide* Ether).

Poultices applied in the same way as for lumbago, and followed by the application of lint and oilskin, are often useful in severe forms of pleurodynia and myalgia. Belladonna liniment is usually sufficient, and even to be preferred in pleurodynia; and sometimes ether spray at once and permanently removes the pain of this annoying affection.

As we have said, poultices may be made of various substances, linseed-meal, oatmeal, bread, or starch. Each has its peculiar character. Linseed-meal and oatmeal poultices have most properties in common; they make compact and only slightly porous poultices, retaining heat and moisture longer than other kinds, and are consequently often to be preferred to bread or starch. But linseed contains an inconsiderable quantity of acrid matter which sometimes irritates, especially if the skin is of a fine and delicate texture, or if it is inflamed by some eruption, in which case oatmeal or bread must be substituted. Bread poultices are more porous and blander than those of linseed-meal, but the porosity depends very greatly on the way of making them. Bread poultices cool more quickly, and give less moisture to the skin, than those made of linseed-meal. Starch poultices retain their heat for a considerable time, and are very bland, unirritating applications.

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* Galvanism is highly useful in some forms of these complaints, especially in lumbago. In sciatica it gives at least temporary relief, and in some cases a few applications effect a cure. Sciatica and deep-seated pains about the shafts of the long bones, even the dull aching pain in the joints, which not unfrequently remains after an attack of acute rheumatism, will often yield to galvanism.

It is as well to mention that linseed-meal poultices are more tenacious than those made of bread, and are therefore less liable to break up and fall about the bed and clothes of the patient, rendering him uncomfortable.

In making a poultice, care should be taken that the water boils, and that all the materials, linseed-meal, linen, strappings, bandages or tapes, wool and oil-silk, are close at hand ready for use, and placed before a good fire to be thoroughly warmed. To manufacture a linseed poultice, sufficient boiling water should be poured into a heated bowl, and the meal must be quickly sprinkled into the bowl with one hand, while with the other the mixture must be constantly stirred with a knife or spatula, till sufficient meal has been added to make a thin and smooth dough. The mixture should be compounded as rapidly as possible, otherwise the poultice when made will be almost cold. Only an experienced hand can make a model poultice. By adding the meal to the water, with constant stirring, instead of the water to the meal, a thorough blending of the two ingredients is insured, not a knotty, lumpy, uncomfortable mass, too often vexing instead of soothing to the patient. The dough must then be spread quickly and evenly on the warm linen, already cut of proper size and shape, the edges of the linen turned a little way over the meal to prevent any portion escaping beyond the linen, and to protect the patient's clothes.

There are two methods of making bread poultices. One way is to cut the bread in thickish slices, put it into a basin, pour boiling water over it, and place the soaking mass by the fire for five minutes; then pour off the water, add fresh boiling water, and place by the fire; afterwards draining the bread, beat up with a fork, and spread the poultice. The other plan is to cut stale bread into thick slices into a saucepan and pour enough boiling water over it to cover it; place the whole by the fire, and allow it to simmer for a short time, then strain and prepare the poultice. The first plan makes a porous poultice, the second a more compact poultice, sharing the character of linseed meal. As we shall see, each poultice has its fitting application.

Bran poultices are useful on account of their lightness.

Starch poultices are entirely unirritating and retain their heat for a considerable time. The way to proceed is to add a little cold water to the starch, and to blend the two into a pap; then add sufficient boiling water to make a poultice of the required consistence, which must be spread on linen in the manner already described. Starch poultices sooth open cancers, and allay skin eruptions when there is much inflammation, heat, and pain.

There are several ways of employing charcoal as a poultice. It is used to prevent disagreeable odours from foul sores, and it is thought also to promote a healthy condition of the tissues. When employed for this double purpose, charcoal is added to the poultice. As a porous poultice is here required, bread is better for the purpose than linseed-meal. A portion of the charcoal should be uniformly mixed with the bread, but the greater part should be sprinkled over the surface of the poultice. It is doubtful whether a charcoal poultice is greatly superior to a simple bread poultice; for the charcoal must soon cease to absorb gases, and thus lose its deodorizing property. It may perhaps promote a healthier condition in the sore. If the object is merely to prevent disagreeable smells and to keep the air of the room pure, the plan pointed out in the section on charcoal is to be preferred.

It is a good practice to sprinkle foul, sloughing, putrid sores with dry charcoal, and over the charcoal to place simple poultice. This treatment appears to hasten the separation of the sloughs, and to promote a healthier state of the tissues, and may be applied to a boil when the core is separating, or to a bed sore while the black slough still adheres to the living tissues.

Some maintain that a yeast poultice is useful in sloughing sores, and that it prevents destruction of the tissues, and promotes the separation of sloughs. Yeast poultices are made in two ways. Yeast and water may be added to flour till ordinary dough is made, and the dough is applied while fermentation is going on. In this case it is simply an application of "rising dough." The other way is to smear warmed yeast over the surface of a simple bread poultice.

A carrot poultice, which is supposed to make wounds cleaner and healthier, is made by boiling carrots till they become quite soft, mashing them with a fork, and spreading the pulp on linen in the ordinary way.

Laudanum is sometimes added to poultices to ease pain; and it is especially effectual when the skin is broken.

Solutions of chloride of lime or of soda may be added to poultices to destroy offensive gases given off from unhealthy sores.

In eczema, with much inflammation and sensation of heat, Dr. McCall Anderson recommends a cold potato poultice sprinkled with a small quantity of absorbent powder, containing camphor. The powder, a useful dusting powder without the poultice, is composed of half a drachm of camphor, reduced to powder, with rectified spirit, and three drachms each of powdered talc and oxide of zinc.

Professor Marshall employs an iodide of starch poultice to clean sloughing sores. A jelly is made with two ounces of starch mixed with six ounces of boiling water, to which before it cools should be added half an ounce of liquor iodi. The mixture is spread on lint, and applied cold.

Fomentations by means of flannel wrung out of boiling water are employed for similar purposes as poultices. They are used for the sake of their moisture, but especially for their warmth, and they differ from poultices in being less weighty, and therefore less likely to increase the pain of very tender parts. The flannel is wrung out by means of a wringer made of stout towelling attached to two rods. The boiling wet flannel is placed in the wringer, which is then twisted round the flannel very strongly, till the water is thoroughly squeezed out. As the flannel when first taken from the boiling water is too hot to be held in the hands, the wringer is useful. In the absence of a wringer an ordinary towel will answer fairly well. Wrung as dry as possible, these fomentations may be used very hot without fear of scalding or blistering the skin. The fomentation should be covered outside with a piece of mackintosh, and tied on with bandages. As hot fomentations quickly cool, and being used chiefly for the sake of heat, they must be frequently renewed; when finally removed, the skin must be carefully wiped dry, and covered with flannel or cotton-wool, to prevent catching cold.

Fomentations, and in a less degree poultices, relax spasm in the internal organs, as in intestinal, renal, and biliary colic. In very extensive inflammation fomentations are preferable, as a large poultice is heavy and uncomfortable. Thus fomentations are employed when a limb is extensively affected with erysipelas, or when the tissues have been widely contused and have become inflamed.

Sponging the face with water as hot as can be borne, is a very useful application in acne indurata; it will disperse the incipient spots, and limit the size and hasten the maturation of the more matured ones, and at the same time greatly lessen for some hours the redness of the eruption.

Twenty or thirty drops of turpentine sprinkled on a hot fomentation of the above description, makes a good counter-irritant, useful when it is needful, to combine a stimulating with a warm, soothing action.

Sometimes it is desirable to apply heat to a part of the surface of the body, when at the same time it is important to avoid relaxation of the tissues which moisture would produce. In such cases various dry, strongly-heated applications are used. Flannel, almost scorched before the fire, or in an oven, is sometimes employed, but it speedily loses heat. Sand, or chamomile flowers retain heat far better; they may be strongly heated over the fire or an iron pan, and then be run into a heated linen bag made for the purpose, of such shape and construction that the contents shall form a thickish and even layer. Each substance possesses its respective advantages; sand, though heavy, retains heat; chamomile flowers, though light, soon lose their warmth. A thin piece of flat tile, heated in the oven, and wrapped in flannel, is lighter than sand, retains its heat for a considerable time, and is easily procured. These applications are of great service in relieving the pain of spasms.

THE USES OF ICE AND THE SPINAL ICE BAG.

Ice is frequently used to abstract heat, to check bleeding, to allay inflammation, and to destroy sensation. Ice, broken up with the help of a large needle into small fragments, may be enclosed in a bladder or thin india-rubber bag, first squeezing the air out of the bag. After filling the bag about one-third its capacity, its mouth should be tied on a cork so as to afford a purchase for the twine. The ice bag may then be adapted to almost any shape, and fitted to the inequalities of the body, and if required, may be fashioned into a sort of cap for the head.

This cap is often applied to the head in tubercular and simple meningitis, and it may be employed to allay the severe headache of the early stages of acute fevers. Sometimes the ice-bag is laid on the epigastrium to ease the severe pain and vomiting of chronic ulcer, or of cancer of the stomach. It may be applied in prurigo of the vulvæ; other treatment, however, is generally to be preferred.

A lump of ice is sometimes inserted into the uterus, or pushed into the rectum, to arrest uterine hæmorrhage after delivery.

Ice is used internally for a variety of purposes. Sucking ice allays thirst, and is very grateful to fever patients. It is likewise sucked to check bleeding from the mouth or throat, stomach or lungs. To check bleeding from the stomach small pieces should be swallowed.

The constant sucking of ice is most efficacious in combating acute inflammation of the tonsils or throat; it also is very beneficial in tonsillitis, the sore throat of scarlet fever, and other acute specific throat diseases, and even in diphtheria. It often proves most soothing, allays the heat and pain, and checks the abundant secretion of mucus, which is so harassing from the constant hawking and deglutition it occasions. In diphtheria, and indeed in all inflammations of the throat, the good effects of ice, especially when used at the very beginning of the attack, are most marked. The ice should be sucked as constantly as possible, and be continued till the disease has fairly declined.

In the same way ice is employed to allay the nausea, sickness, and pain of disease of the stomach.

Ice may be applied to an inflamed and prolapsed rectum or uterus, to reduce inflammation and swelling, so as to enable these parts to be returned to their proper place.

Some apply ice to the head in delirium tremens and in the convulsions of children.

The application of a small bladder or india-rubber bag of ice will dull or even neutralize pain after an operation for piles or fissure of the anus.

M. Diday strongly recommends the local application of ice in such painful affections of the testes as neuralgia and blenorrhagic orchitis. Two pigs' bladders partially filled with ice are applied one under, the other over the testes, the neighbouring parts being protected with napkins. The pain in orchitis is at first rather increased, but soon declines and in a few minutes altogether ceases. The continuous application of ice-bladders for twenty-four to forty-eight hours permanently removes the pain in many cases. If on pressure any tenderness remains, the pain will return, and the ice must be continued three, four, and even five days according to circumstances. On discontinuing the ice, wet cold cloths should be used to permit the tissues to return gradually to their normal temperature.

Two parts of finely pounded ice with one part of common salt produce cold sufficient to freeze the tissues and to deprive them of sensibility. This mixture, largely used by Dr. Arnott, is confined in a gauze bag, and placed in contact with the skin till sensation is abolished, and the skin has a leathery feel and assumes a shrunken tallowy appearance. If applied too long, this mixture may vesicate; but this will not occur under five or six minutes. This application is employed to prevent the pain of minor operations, as extraction of the toe-nail, and the opening of abscesses. Dr. Arnott recommends it in chronic rheumatism, in erysipelas, lumbago, and in wounds. In chronic rheumatism it should be applied to the diseased joints for six minutes; it should then be replaced for a short time by pounded ice, to prevent the occurrence of inflammation from too rapid a return of heat to the tissues. An attack of lumbago may be often cured by freezing the skin over the painful part. Dr. Arnott asserts that when applied to wounds this mixture prevents inflammation without hindering union by the first intention.

Applied for some hours, this mixture destroys sensibility to such a degree that chloride of zinc paste may be used in sufficient quantity to destroy the tissues to a considerable depth, without inducing pain or inflammation. But ether spray, so conveniently and rapidly used in the manner introduced by Dr. Richardson, is now generally preferred for the purpose of freezing the tissues.

A single application of ether spray will often remove lumbago;* ether spray sometimes relieves sciatica, and those frontal headaches commonly called nervous, arising from either mental or bodily fatigue. Frontal headache, dull and uniform in character, lasting many days, occurring not uncommonly after excitement or an acute illness, such as erysipelas, a severe cold, or a sore throat, often succumbs to ether spray; but it is generally requisite to freeze the skin of the forehead.

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* The pain and stiffness of the muscles of the back in lumbago may often be instantaneously removed by running a needle an inch or more into the painful part; when the lumbago is double, this almost painless operation should be

ON THE SPINAL ICE BAG AND THE SPINAL HOT WATER BAG.

The profession is indebted to Dr. Chapman for the introduction of these applications, and for a rational explanation of their action.

Concerning the spinal ice bag, Dr. Chapman says, "I have proved by numerous experiments that cold applied to the back, exerts not only a sedative influence on the spinal cord, but also on those nervous centres which preside over the blood-vessels in all parts of the body. The *modus operandi* of this influence on those centres, and its effects, may be thus stated: "1st. It partially paralyses them. 2nd. By means of the partial paralysis thus effected, it lessens the nervous currents in the vaso-motor nerves emerging from the ganglia or nerve centres acted upon and stimulating the muscular fibres surrounding the arteries influenced. 3rd. By thus lessening those currents, it lessens the contractile energy of the muscular bands of the arteries to which those currents flow, and by doing so facilitates the dilatation of the arteries themselves. 4th. By thus inducing the condition of easy dilatability in the arteries acted upon, it enables the blood, which flows in the direction of least resistance, to enter them in greater volume and with greater force than before."

These effects are analogous to those obtained by Claude Bernard. On dividing the cervical sympathetic nerve, he found that the vessels of the parts supplied with this nerve became

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performed on both sides of the loins. Inserted along the course of the sciatic nerve, the needle sometimes affords instant and marked relief even in very chronic cases of sciatica. This treatment indeed, sometimes, as if by magic, cures severe and long-standing cases. The passage of an interrupted galvanic current will speedily relieve lumbago.

suffered for so many years; and when she called up[illegible] week after the treatment had ceased, her newly acquire[illegible] of general circulation, denoted by her increased wa[illegible] continued. Case 2 of this series affords a remarka[illegible] the proposition in question: The patient, a man, a[illegible] who seemed nearly seventy, suffering from paral[illegible] and other grave troubles, complained that he was [illegible] all over;' that he suffered especially from cold[illegible] even in the hottest weather, and was obliged, [illegible] 'to sit near the fire in summer.' Within ou[illegible] treatment, which was continued three month[illegible] become warm all over—especially the feet. [illegible] said, 'I feel as well as possible; but very hot [illegible] case, after the ice had been left off for so[illegible] became cold again."

Dr. Chapman asserts that ice applied [illegible] and lumbar vertebræ, by increasing the [illegible] to the pelvic organs, promotes mens[illegible] restore the suppressed monthly flux. [illegible] the flow of blood to the legs proves [illegible] harassed with cold feet; and I have [illegible] comfortably warm a few minutes aft[illegible]

Dr. Chapman asserts that ice [illegible] [illegible] useful in cholera and teta[illegible] vomiting of pregnancy.

THE SPINAL [illegible]

The physiological effects pro[illegible] might be inferred the opp[illegible] Chapman says that, "1st. [illegible] being raised, the [illegible] and the function[illegible] [illegible] Their [illegible] streams [illegible] over the [illegible] hands [illegible] nervous [illegible] diminish [illegible]

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as urea, phosphoric and sulphuric acid, and chloride of sodium. The augmentation of these constituents, with the exception of the chloride of sodium, is permanent, but with respect to this salt the increase is only temporary, for after a while its amount falls below the quantity excreted in health, and thus the previous increase is balanced; and water must therefore, in regard to common salt, be considered merely a temporary eliminator. The case is different, however, with urea, phosphoric and sulphuric acid; for water-drinking induces a fixed increase of these substances, giving rise not only to their increased elimination, but to their increased formation, which can happen only from augmented disintegration of substances containing nitrogen and sulphur. Did water-drinking exert solely a disintegrating influence, it would lead merely to loss of weight; but simultaneously with this rapid disintegration a corresponding increase of assimilation takes place in the same tissues; whence it happens that water, taken under certain precautions, may increase both construction and destruction of tissue, and so act as a true tonic, improving the vigour of body and mind. These considerations suggest an explanation of the benefit often derived from the "water treatment" in hydropathic institutions.

The effects of water-drinking vary in different persons. The disintegration is greatest in weakly persons, on whom this process may produce almost a febrile state. Disintegration is greater in children than adults, and greater perhaps in women than in men. A high temperature of the water, or of the external air, increases disintegration. Bodily exercise produces the same effect (Parkes *on Urine*).

ON ENEMATA.

INJECTIONS are used for a variety of purposes; to procure evacuations of the bowels, to restrain diarrhœa, to ease pain about the region of the pelvis, to destroy worms, to introduce medicines into the general system, and lastly, to pass nutritive substances into the rectum, in cases where food cannot be taken by the stomach.

For each of these purposes certain points must be attended to in the administration of enemata.

First, concerning injections used to relieve the bowels. It must be clearly understood that an enema seldom acts by merely washing away the fæces; for it acts efficiently when the fœcal matter is lodged high up the intestines; even in the transverse colon or cæcum. They probably stimulate the whole intestinal tract to more vigorous peristaltic action, by which means the contents are propelled along the canal, and finally expelled, the injected fluid distending the lower part of the large gut, and so exciting the vermicular action of the intestines far beyond the point reached by the injection. The object therefore is to distend the rectum and the adjoining part of the intestine, but an enema constantly fails because not enough fluid is introduced to excite contraction. It is necessary to introduce a considerable quantity of fluid, as much as two, three, or even four pints. Any one, who, for the first time, without due observance of certain conditions, attempts to introduce a copious injection into the rectum, will in all probability fail.

When a copious injection is to be given, the patient should be placed on his left side, and the fluid must be slowly pumped into the rectum; after a variable, but usually a short time, the patient complains of inability to retain more, and suffers from colicky pain in the belly, and an urgent desire to empty the bowels. The pumping must now be intermitted for a while, and the patient directed to prevent the escape of the fluid; but if he is unable to control the sphincter, the administrator must help him. This can be done in several ways, each having for its object the strengthening the contraction of the sphincter. The simplest, but not always the most successful plan, is to firmly support the perinæum and structures around the anus, either with the bare hand, or with the aid of a folded towel. Should this support prove ineffectual, which is often the case after a considerable quantity of fluid has been introduced, further assistance is afforded by passing into the rectum, alongside the nozzle of the enema-pipe, one, two, or even three fingers, as circumstances may require, and pressing them with the nozzle strongly upward. Stimulated in this way, the sphincter firmly grasps the fingers, and effectually prevents the escape of the fluid; indeed, with these precautions, almost any amount of fluid may be pumped into the intestines. From time to time the patient will complain of griping pains and an oppressive desire to go to stool, when the pumping should be stayed awhile, and recommenced as soon as these symptoms pass away. The operation over, the patient must be directed to lie quite quiet on the left side, and if possible, to retain the fluid for ten minutes or more, so as to ensure a more active and thorough contraction of the bowels.

It need scarcely be mentioned that if the rectum or lower part of the large intestine is the seat of cancer, or is diseased in other ways, copious injections, and the introduction of a long tube, are attended with danger.

Sometimes the rectum and lower part of the gut is blocked to distention with fæces, against which the injected fluid impinges, and finding no passage it of necessity flows back through the sphincter as fast as it is pumped in. One or two ways may be adopted to force such a blockade. A hollow tube of some inches in length is passed through the impacted fæces, till its free extremity reaches the sigmoid flexture, or even higher. If the tube is passed through the accumulation in the intestine, the injection can easily proceed. Should this manœuvre fail and the need is urgent to obtain an evacuation, then two or three fingers, according to the yielding of the sphincter, are to be introduced in the rectum, to withdraw the fæces. This can be easily accomplished if the fæces are hard and firm. Obstinate constipation, of this character occurs most commonly in diabetes. The hard and almost stone-like fæces can easily be withdrawn by the fingers in the manner described; and much more may be withdrawn than is contained in the rectum, for although the intestines may be unable to force the hardened fæces through the sphincter, they are quite capable of propelling them into the rectum; consequently, as fast as the fæces are withdrawn, fresh supplies are propelled downwards within easy reach of the fingers.

Various fluids are employed as enemata. Sometimes simple warm water or gruel; at other times, to one or other of these, is added soap, turpentine, or castor oil. When castor oil or turpentine is added to the injection, soap or gruel is generally employed to help to suspend these substances. It must be recollected that castor oil and turpentine are lighter than water, and will float on its surface, so that if the oil or turpentine is added to the fluid to be injected, although the whole may be well stirred, yet, as the injection proceeds, the oil rises to the surface. As the tube of the syringe lies at the bottom of the vessel, the lower stratum of the liquid is first injected, and much of the oil or turpentine either floats on the surface, or sticks to the sides of the vessel, while the small portion ultimately injected operates only upon the rectum and the neighbouring intestines. The object should be to make the oil or the turpentine, as the case may be, rise as high up the canal as possible, so as to bathe and influence the mucous lining of the intestines. The oil or turpentine well beaten up with three or four ounces of gruel, or soap and water, should be first injected, and then the water is to be pumped in, so as to force the oil far up the intestinal canal.

What should be the temperature of an injection? Tepid fluid is generally used, but some consider that an injection differing in temperature widely from that of the body, acts more energetically on the tissues, and excites the intestines to more vigorous action. Thus cold or hot water may be used, and very cold water may be injected without inconvenience, and without the patient's cognizance of its temperature.

It is unadvisable habitually to use warm evacuant enemata, lest a torpid condition of the intestines ensue, which will ultimately render the constipation worse.

As we have said, large quantities of water are employed to unload the bowels, this is not the sole use of a free injection. If used comfortably warm, it is very soothing to the intestines and to the neighbouring organs. Thus warm injections will often much mitigate the pain of cancer, either of the intestines or of the adjacent organs; injections, also, often greatly relieve the very distressing straining desire to evacuate, without any riddance of fæces, which occur in intestinal cancer. Warm injections soothe the pain of cystitis, prostatitis, abscess of the prostate, and pelvic and abdominal pains generally. (*Vide* Opium and Belladonna.)

In some instances of suppression of urine copious injections appear to act beneficially.

Injections are often successful in restraining obstinate or dangerous diarrhœa. It is by no means necessary for the injection to reach that part of the intestines upon which the diarrhœa depends; for whether the mischief is situated in the small or large intestines, the injection is equally beneficial, owing no doubt to a close sympathy between the different parts of the intestines, so that an impression made on one part is communicated to another. In restraining diarrhœa only a small quantity should be injected, otherwise the intestine is stimulated to contract and expel the enema, when it should be retained as long as possible, in order the more effectually to influence the bowels. An injection of an ounce, or at most two ounces, is sufficient for an adult; and it may be repeated several times a day according to the urgency of the diarrhœa.

The material used in such enemata is starch, boiled or raw, of the consistence of cream, and at a temperature of 100°. An injection simply composed of starch proves effectual; but its astringent sedative action may be much heightened by the addition of some drops of laudanum, graduated in quantity according to the patient's age and condition. The addition of some acetate of lead or sulphate of copper renders this injection still more astringent. These injections are invaluable in cases where delay is death. They will save many a life in the choleraic diarrhœa of children, which so rapidly proves fatal unless speedily restrained. The diarrhœa of typhoid fever, which, if excessive, adds extremely to the patient's danger, yields generally to these injections, so usually does the diarrhœa of phthisis.

Injections are commonly used to destroy thread-worms, which infest the rectum and the intestines in its immediate neighbourhood, but occur in no other part of the canal. As the object of the injection is to destroy these entozoa, a sufficient quantity of fluid should be employed so as to reach a little higher than the rectum. For an adult, half a pint is sufficient, and for a child, of course, less. To the water injected, various substances can be added, as common salt, tincture of sesquichloride of iron, lime-water, quassia, and various other similarly acting vermicides, with the object either of directly poisoning the worms, or of destroying them by coagulating the albuminous structures of their bodies. Injections are always successful in removing worms, and thus affording temporary relief; but it must always be recollected that the morbid state of the mucous coat of the intestines, favouring the production of worms, must be remedied if permanent relief is to be obtained. A teaspoonful of salt, or a drachm of the tincture of steel, to half a pint of water, is sufficiently strong to effect the destruction of these delicately formed animals. Solutions too concentrated must not be injected, otherwise inflammation may occur, perhaps severe enough to cause sloughing in the rectum and margins of the anus.

Nutritive enemata are employed in stricture of the œsophagus, or when tumours press upon this tube and render swallowing impossible, in persistent vomiting, and in painful diseases of the stomach, like chronic ulcer. A nutrient enema should not exceed three or four ounces of bland, unirritating material, otherwise the lining membrane of the rectum becomes irritated and inflamed, a condition adverse to absorption. Mr. Marcus Beck advises the addition to the injection of pepsine and dilute hydrochloric acid. From experiments on dogs, M. Bauer finds that the large intestines freely absorb peptones but that pure soluble albumen is not absorbed, though it is taken up readily on the addition of salt. Acid solutions of albumen, as meat dissolved in weak hydrochloric acid, are also freely absorbed. Fats and starches injected into the large intestine failed to support life for any considerable time. It sometimes happens that the rectum will not retain even four ounces, and this inability is more liable to occur after injections have been continued for some time. Before giving a nutritive injection, it must be ascertained that the rectum is not filled with fæces.

Dr. W. O. Leube employs the pancreas of the ox or pig as a ferment. One part of finely minced pancreas being mixed with three parts of scraped meat rubbed well together with warm water, so that the mixture is easily injected. Fat, not exceeding one-sixth part of the meat may be added. This injection is retained from twelve to thirty-six hours, and the stools afterwards generally possess an ordinary fæcal character. By experiments on dogs, Dr. Leube has proved that by means of injections a considerable quantity of nitrogen can be taken up into the system.

Astringent and stimulating injections, composed of a pint of water, and containing ten to twenty grains of sulphate of copper, or corresponding quantities of nitrate of silver and sulphate of zinc, prove of great service in restraining the troublesome straining diarrhœa of chronic dysentery. In the earlier stages, also, of dysentery, large emollient enemata prove useful, especially by removing the fœtid discharges, and soothing the inflamed mucous membrane. In other sections, whilst treating of individual drugs, various additional uses of enemata are pointed out.

ON ACUPUNCTURE.

Acupuncture is a very successful mode of treating lumbago. It will rarely fail to afford relief, and in the majority of cases it will cure at once, though the lumbago has lasted a week or even three weeks. It succeeds best by far in typical cases of lumbago, when the loin muscles of both sides are affected and the pain is most severe on a to-and-fro movement. I have treated a large number of such cases by acupuncture and find that it gives almost instantaneous relief. It is generally sufficient to run the needle once deeply, say an inch into the muscles on each side of the spine, over the seat of greatest pain. Perhaps it may be better to leave the needles for a few minutes sticking in the back, but I have hitherto found this proceeding unnecessary.

Generally when the needles are first withdrawn the patient says the pain is slightly eased, but presently it decreases rapidly and in three or four minutes it is entirely gone, perhaps a little stiffness only remaining, but even this may be absent. The patient who just before could not bend in the slightest degree without the greatest pain, who could not possibly stoop to touch his toes, now bends backwards and forwards with the utmost ease, often with a look of astonishment mingled with incredulity, as if the cure were too wonderful to be true.

Faradization of the back is in my experience almost as successful as acupuncture, though the pain more frequently returns than after acupuncture. Under either treatment it sometimes happens that after several hours of relief, the pain returns, and a renewal of the treatment may either be almost without avail, or its influence may rapidly grow less and less. Freezing the back with ether spray or with Arnott's ice mixture is also often successful. So also is the old-fashioned way of ironing the back with a common flat iron, as hot as can be fairly borne passed over a piece of brown paper placed across the loins. The thermic hammer, too, often succeeds in subduing lumbago. These modes of treatment I have found not so successful in the less typical forms of lumbago; for instance if the pain on movement is restricted to one side, or is felt only on twisting or turning the body and not on bending to or fro.

Lumbago is not uncommonly associated with sciatica or shooting pains along some branches of the lumbar nerves, sometimes the pain shooting along the skin in the front of the body, and along the groove in the groin. Sometimes on curing the lumbago, we, as the patient terms it, "drive the pain" into some of the branches of the lumbar or sacral plexus, which then assumes a neuralgic character. When these two pains are associated I find that it is easy to cure the lumbago, but that the sciatica or other neuralgic complication, remaining unrelieved, is far more difficult to dispose of. Occasionally after curing the back by galvanism or the needles, the neuralgic pains give way to be replaced by the lumbago; and when the lumbago is got rid of, the neuralgic pains recur. Let me repeat that these compound cases are generally obstinate, and the neuralgic factor the most so. Acupuncture will prove useless, when lumbago is accompanied by high fever, or when it is the first symptom of acute rheumatism.

It is a good plan when rid of the lumbago to apply to the back, a belladonna, or a lead, or a Burgundy pitch plaster spread on leather, both on account of the warmth and the support it affords. The Burgundy pitch plaster sticks closest but is very apt to irritate delicate skins, especially in warm weather, and often indeed cannot be borne. Even lead or belladonna plaster may irritate the skin, bringing out a papular or eczematous eruption, due in part to the retention of perspiration, which decomposing irritates the skin. By removing the plaster every few days, wiping it, and washing the skin, and then reapplying the plaster this irritation may often be prevented, or the plaster may be perforated after the manner of Alcock's porous plaster.

I have found acupuncture far less successful in the treatment of sciatica; in a few cases it acts no doubt as speedily and as completely as in lumbago, but this prompt action is unfortunately the exception. Some hold that it is necessary to pierce the nerve and the uncertain results of acupuncture in sciatica may possibly be due to the needle sometimes impaling the nerve, but more frequently missing it. This treatment generally gives some, though generally very transient relief, lasting only from a few minutes to an hour or so. In cases due to diseased spine or pressure on the nerves from abdominal solid tumours, abscesses, or fæcal accumulation, acupuncture is not appropriate. The needle must be thrust in deeply, even to the bone, in various places over the seat of pain in the course of the affected nerve. When only partially successful, this treatment removes the pain along the course of the sciatic nerve, but generally leaves unaffected the pain below the knee, especially outside the ankle. Indeed I may add that whilst all forms of sciatica are obstinate, those cases are most rebellious when the pain reaches below the knee, or when it is restricted to the region above the sciatic tuberosity.

Acupuncture, or incisions, into the dropsical tissues of the feet and ankles, or lower part of the calf, is an old but now too much neglected mode of treating both cardiac and renal dropsy. Acupuncture no doubt sometimes excites erythematous inflammation, sufficient to cause the dropsical, vitally depressed tissues, to slough extensively and progressively. In one instance I have seen the muscles not only laid bare, but dissected out over the lower part of the calf, to the extent of eight square inches, yet in this case after the dropsy had drained away, the tissues recovering their lost vitality, healed, and the man left the hospital greatly improved. It is better to make incisions instead of pricks with the acupuncture needle. The incisions should be from three quarters to an inch long, and should reach well into the subcutaneous tissue, and the legs should be kept dependent and be enveloped in hot fomentations. The feet and ankles should also be placed in hot water for an hour night and morning, to aid the escape of serosity. As hot fomentations sometimes bring out a troublesome crop of eczema, it is well to keep over the incision a moist sponge wrung out in hot water, to soak up the discharge, but unless this is very frequently changed the dropsical fluid will surcharge and run through the sponge, therefore the bed should be protected by a large piece of mackintosh. It is not amiss to mention that the discharge quickly decomposes, and becomes offensive, hence the clothes and sponges used should be washed in a solution of chlorinated soda, or moistened with a weak solution of carbolic acid. These free incisions allow the easy escape of the dropsical fluid, to the relief of the distended and depressed tissues in the neighbourhood of the incisions, thus lessening the likelihood of inflammation and sloughing, which are very apt to occur after mere pricks. One incision over each outer malleolus is generally sufficient. With incisions though there is not much fear of sloughing, still as this untoward event may occur, it is better not to incise, especially with very old or very weak patients, till other methods have been tried and have failed, on account of the weakness sometimes resulting from the loss of the albuminous fluid. The benefits of

CONTINUATION OF ACUPUNCTURE. (Page 59).

In cardiac dropsy it appears to me that this treatment is more beneficial, when due to aortic than to tricuspid mischief. In dropsy due to aortic regurgitant disease, there is a greater tendency to effusion into the pleural and abdominal cavities than when due to tricuspid disease, and the dropsy increases more rapidly. Thus when dropsy invades the feet, it usually spreads quickly up the legs, and before the legs are extensively swollen hydrothorax often sets in, embarrassing the already distressed breathing; so that in heart disease and especially in the aortic regurgitant form, in addition to the paroxysmal panting dyspnœa due to the heart mischief, we have the constant dyspnœa or orthopnœa of hydrothorax; the orthopnœa greatly predominating over the dyspnœa directly dependent on the heart. The incisions into the leg drain off the fluid from the upper parts of the body, first emptying therefore the pleural cavities, and promptly removing the greater part of the dyspnœa. This treatment is also useful in the dropsy of Bright's disease.

How long will it be before the fluid reaccumulates and the advantage thus gained is lost? In tricuspid dropsy, so long as the valvular incompetency continues, the dropsy will return, and the rapidity of its recurrence will of course depend on the degree of regurgitation. In aortic dropsy, and the dropsy from Bright's disease success is often much greater. In some cases, indeed, one operation often dissipates the fluid never to reaccumulate; though more often, two or even more operations at varying intervals are necessary, the fluid each time returning less and less rapidly. In cases of very extensive dropsy, strange to say, I have known the fluid not to return, although the disease of the heart or kidneys has remained unaffected. Thus, the amount of albumen, and the quantity of urine has remained just the same in cases of Bright's disease, and yet after draining away the fluid it has never returned. I have seen this excellent result in a case where the tissues were shiny with distension; the abdomen largely distended with fluid, and the albumen on boiling, occupying half the test-tube, yet after draining away the dropsy by incisions, the fluid never reaccumulated, though the proportion of albumen continued the same, this patient remained free from dropsy more than six months after the operation.

this treatment are prompt and striking. In extensive dropsy several of the more distressing symptoms, especially the dyspnœa, are due to the accumulation of fluid in the cavities, as of the pleura, hampering respiration.

"COUNTER-IRRITATION" OR THE INFLUENCE OF "LOCAL" AGENTS ON DISEASE.

THAT local applications are capable of external topical controlling disease, I believe few practical men will be inclined to deny, though from time to time on this point some scepticism finds expression.

The influence of local applications are transmitted in three different ways.

1. By mere contact.

2. The active principle of the topical agent may pass deeply into the tissues and affect the deep parts.

3. The influence may travel through the nervous system along afferent nerves to the nerve centres and be thence reflected to distant parts.

The spread of disease by mere contact is evidenced in that form of ulcerative stomatitis affecting the edges of the gums, when the cheek and tongue opposed to the inflamed and ulcerated surface becomes inflamed and ulcerated; and similar extension of inflammation and ulceration by mere contact is witnessed in the spread of non-specific, as well as specific, sores from the glands to the prepuce, or *vice versâ*; and likewise when we find a group of tubercles on the pulmonary pleura, formed also on the opposite costal pleura, the morbid process having extended from one surface to the other, without the intervention of adhesions between the pulmonary and parietal membranes.

The second means of extension by the passage of the active principle of the local application to deep parts is probably sometimes exemplified in the case of blisters, &c., for Dr. Inman and others have shown that blisters, and other counter-irritants, applied to the chest or abdomen, will in some instances excite inflammation of the corresponding part of the pleura or peritoneum; again, an irritant applied to a knee distended by synovitis or rheumatism, increases the distension for a day or two.

By the third means pointed out we affect distant parts not texturally connected with the tissues to which the topical agent is applied, except through the nervous or vascular system. In this way we can influence distant parts both in health and in disease. If in a state of health as Brown Séquard points out, we irritate the skin over the kidneys, the renal arteries will contract; and cold applied to part of a bat's wing will cause contraction of the vessels of the corresponding part of the opposite wing. Irritants like snuff applied to the nose excite sneezing, and ipecacuanha by its effect on the terminations of the nerves of the stomach excites nausea, a complex act, involving not only an elaborate co-ordinated muscular movement, but also increased secretion of the salivary glands and of the mucous membrane of the bronchial tubes. There are many other well-known physiological instances of the production of distant effects by means of a topical application.

The remote effect of a topical agent is made manifest in disease in a twofold manner:—(1) by the irritation produced by a given pathological condition (2) by a medicinal application. The effect of a pathological topical irritant is shown in the following examples:—

The influence of a local irritation in the production of neuralgic pains at a distance from the starting point is well exemplified in neuralgia of the various branches of the fifth nerve from a diseased tooth. Cases are on record, where irritation of one nerve has excited neuralgia in another nerve anatomically unrelated to it; for instance, injury to the ulnar nerve has produced neuralgia of the fifth. Various serious nutritive changes may take place over the secondary seat of pain, the implicated tissues becoming red, swollen, very tender, and even indurated, and neuralgia of the temple often turns the hair of that part rapidly grey, whilst neuralgia of the eye leads to serious inflammation, sometimes even to ulceration, of that organ. Secretion too, may become modified; thus each paroxysm of pain may increase, diminish, or alter the salivary or lachrymal secretions.

The effects of a medicinal application in disease is well exemplified in the following instances:—

The application of aconitia ointment over a painful neuralgic nerve often relieves distant neuralgias, and sometimes sickness. (See Aconite). For instance, we often find a case of neuralgia of the ophthalmic branch of the fifth nerve followed in some hours by neuralgia of the auricular or occipital nerve. Here the ointment, by relieving the supra-orbital pain, will prevent the neuralgia of the other nerves. Again, in neuralgic sick headaches this ointment, by abolishing the supra-orbital pain which often radiates far above the brow, will prevent the consequent sickness.

The influence of a topical remedy travelling through the nervous system will affect distant diseased parts in two ways:—1. It may act through a healthy nervous system:—2. It may modify or remove disease of the central nervous system and so remove or lessen the effects of that disease manifested on a distant part.

I have already exemplified the first means of reaching disease through the healthy nervous system, and will attempt to show that it is probable, or at least feasible, to infer that in various ways we can modify nutrition, secretion, &c., according to the nature of the application, and that we may hope in time to apply our local remedies with far greater precision than heretofore so as to increase, check, or alter nutrition or secretion and to control diseased changes.

I will first consider the influence of topical applications on distant parts through the healthy nervous system, starting with the general proposition,—that by means of local agents we can induce in the central nervous system a measureless variety of changes. First I draw attention to the fact that sensory nerves can convey a great variety of impressions and must produce a corresponding variety of impression on their nervous centres. Trophic nerves, or if there be no trophic nerves then some other nerves ministering to nutrition and secretion, modify these processes in manifold ways and so must be capable of transmitting various impressions. These varied influences on nutrition depend of course on the condition of the nervous centres; and if we are able variously and in different degrees to influence these nervous centres we may fairly expect, in many modes and in different proportions, to modify nutrition and secretion in distant parts supplied by the trophic nerves.

The nerves of sense will amply illustrate the numberless independent impressions transmissible by the nerves.

(*a*). *Smell.* The odour of two kinds of flowers is never alike and we can detect one kind of flower from another by its scent.

(*b*). *Sight.* The great variety and shades of colour in nature, every species of plant for instance, having its distinctive shade.

(*c*). *Hearing.* No two voices are alike; moreover in sounds we can detect, gradually, an infinite variety of *timbre* or quality of sound, as apart from intensity and pitch.

(d). *Taste.* We can discriminate savours in an endless variety.

(*e*). *Touch.* We know most objects by tactile perception. The same nerve can convey infinite varieties of pain; indeed, it is probable that an identical pain does not occur twice over in two separate illnesses, or in different individuals.

If the doctrine of "specific energies" or "specific function" of nerves should turn out to be correct, it must be admitted that much of the argument in this section will lose its force.

According to this doctrine, the difference between nerves depends on the different constitution of their end-organs, on their peripheral and central terminations. To take the case of the eye:—The peripheral end-organ of each fibre can receive an impression from one colour only, other colours being incapable of exciting an impression on that nerve termination: a nerve termination whose function it is to be excited by yellow, being unreceptive of an impression of blue, &c. Hence compound colours are split up into simpler colours, and so conducted to the sensorium. The same is supposed to be the case with sound, complex sounds being decomposed into its components. In the argument in this section, I have sought to show that each nerve can receive and transmit to the brain a great variety of impressions, and that the trophic and secretory nerves in their turn can also each carry a great many impressions and not merely increase or decrease the activity of secretion or nutrition (oxidation of tissue), but likewise within certain limits modify the nature of the compounds formed in these two processes.

Supposing that a nerve-end can receive, and therefore its trunk can conduct only one kind of impression, it is hard to explain how we can detect *timbre* or quality of sound. We detect one instrument from another, nay, one violin from another by the quality of its sound. Again, how can we explain the great varieties of pain? Is each distinctive pain conducted by a separate nerve, and do these conducting nerves differ from the nerves conducting physiological sensations?

We see therefore that within its natural sphere each nerve can convey an almost endless variety of impulses which must induce a corresponding variety of changes affecting the terminations of the nerves, the nerves themselves, their nuclei and the sensorium; in other words every kind of sensation excites a different molecular arrangement in the nerves and their nuclei. Applications to the skin of mustard, cantharides, aconite, veratria, &c., each produces a distinct characteristic sensation, each determines a distinct molecular arrangement in the nerves and their nuclei.

I may here be allowed to add, that to me it seems inconceivable that a current called nervous, whether electric or allied thereto, can produce the measureless variety of sensations we constantly experience. for a variety in the quantity and intensity of the current would simply intensify the sensation in a corresponding degree. A great variety of sensations must therefore be due to a varying molecular arrangement in the nerves and their nuclei. But if impressions are conveyed through nerves by currents, there must be an endless variety of these currents, which induce or depend on different physical states of the nerve.

Nutrition and secretion then, as we have seen, may be variously modified by the state of the central nervous system. Thus neuralgia of the fifth may cause inflammation or thickening of the skin; or the hair to grow thick and brittle, or to turn grey;

or it may cause ulceration of the cornea or wasting of the retina; or induce thickening of the fibrous tissues; or check, or control, or probably alter the lachrymal and salivary secretion. In the case of the salivary secretion, patients sometimes say that the taste of the spittle is different from that of health, showing that its quality is changed. We have seen that in various ways neuralgias may modify nutrition and secretion. These modifications must depend on different impulses conveyed by the nerves, and these, in their turn, on a different molecular condition of the nucleus, or part of the nucleus.

If in disease various remote effects on the nutritive and secretive processes take place, according to the occurrence of various changes in the central nervous system, it seems reasonable to presume that we may likewise, in many different ways, armed with the power to influence distant nutrition and secretion, fairly hope in time to be able to choose with precision a local application adapted to the nature of the distant change we desire to effect, instead of as now prescribing in a more or less hap-hazard fashion.

Next I shall consider the influence of local applications on the central disease of the nervous system, and the modifying and controlling effects of these agents on disease at a distant part.

Various diseases of the central nervous system manifest distant morbid effects. Thus in neuralgia, as of the fifth, we have pain referred to that nerve with nutritive changes in the territories supplied by it. In megraine we have pain referred to the fifth with nausea, sickness, perhaps slight jaundice or diarrhœa, or constipation; in asthma we have severe dyspnœa; in intermittent hay-asthma, as it has been called, we have energetic and repeated attacks of sneezing; and in epilepsy violent convulsive movements of the whole or part of the body. These diseases, in many instances, we are able more or less to control by local applications, which, by their impressions travelling along the nerves arrest or modify the diseased central changes, and so modify or avert the symptoms.

The effect of local impressions on the central disease I will consider under two heads:—

1. The influence of distant morbid irritation on the central disease.

2. The influence of local applications.

Under these two heads, I will speak of neuralgia, asthma, megraine, and epilepsy.

With regard to neuralgia a few preliminary remarks seem needful. By violence, the application of irritants, &c., to the terminations of a nerve we of course excite pain, and the consequent phenomena follow in this order; the irritant by producing certain molecular changes in the terminations of the nerves, induces similar changes in the nerve trunk and in its nucleus, changes which thence extend to the sensorium, and on removing the cause of pain, the molecular arrangement reverts to its original condition and the pain subsides. In every instance of pain, however produced, molecular changes must involve the nuclei of nerves, or the centripetal fibres passing from them to the sensorium, and these molecular changes must be similar to those occurring in a normal non-painful sensation.

These painful molecular changes of the nucleus may be produced by (1) affection of the nerve in connection with the nucleus; (2) by disease involving, but not destroying, the nucleus; (3) by impressions conveyed by a nerve unconnected with the nucleus, which impressions spread beyond its own nucleus; or leaving its own nucleus unaffected, produce changes in a part with which it is not directly connected; (4) by morbid matters in the blood.

Pain depends on a molecular change different from that of health but of the same nature. Thus for the production of pain from any cause, the composition of the nucleus must remain undestroyed; for were its composition altered we should fail to get these molecular combinations necessary to excite any sensation, whether natural or painful. The nerves, it is evident, cannot excite molecular changes in the nucleus if it is replaced by a morbid growth of any kind. One exception there is, however, to the foregoing statement; thus a new structure like fibrous tissue, tubercle, or cancer, replacing the nucleus, may act as an irritant to the centripetal fibres going to the sensorium, effecting in it molecular changes producing a sensation of pain. With this exception, so slight must be the alteration of the nucleus in neuralgia that with our present microscopes, or chemical tests, we can hardly hope to detect it.

Most authorities, I know, hold that the condition of the nerves and of their centres is the same with a painful as a normal sensation, pain, indeed, being "a gradual increase of the feeling that accompanies every sensory process" and "every increase of ordinary sensory stimuli is capable of producing pain as soon as it attains a certain intensity." Pain, in fact, is stated to be an excessive normal sensation not different in kind but only in degree from the molecular conditions of the nerve and its centre from those occurring in a natural sensation. Hence, pain must always be stronger than the maximum norm al sensations of the nerve. Now I venture to suggest some considerations in favour of the view, that the condition of the nerve and its centre is different in kind to their condition during a natural sensation.

It must be admitted that a nerve and its centre can assume molecular arrangements different from those which occur during a natural sensation. The physical condition of a nerve and its sentient centre must be different in itching or formication from their condition during a natural sensation. Itching or formication, is generally a sensation far too feeble to be accounted an exaggeration of a natural sensation. The condition of nerve and centre must differ altogether from the condition of a natural sensation.

We may have painful formication and painful itching, but the sensations are still of the same character as formication or itching of a weak kind. We can easily detect that either differs only in degree. I am inclined to maintain, that this is also the case with pain which may be so slight that it can scarcely be felt though so distinctive in character that we correctly call it pain of the same kind, as a thoroughly painful sensation. Thus to appeal to my personal experience, I am certain that in the same nerve, as for instance, the supra-orbital branch 'of the fifth and the sciatic, within a few minutes I have felt severe pain, and soon after an exactly similar sensation, but so slight as to be scarcely noticeable. I believe that pain like itching or formication may be of any degree of intensity; so weak as scarcely to be perceptible, or so strong as to be unendurable. It can hardly be maintained that the slightest forms of pain are excessive natural sensations, for on this supposition no pain should ever exist which is not an excess of a natural sensation.

I now present a case which to me seems interpretable best on the supposition that the condition of the nerves and their centres is different in pain from their condition during a normal sensation.

A gentleman suffered from a severe attack of herpes on the left side of his neck, back of head, upper part of chest and back, the eruption coming out in crops, each crop being preceded by very severe neuralgic pains. On recovering from the herpes he was seized with attacks of agonizing itching lasting about a quarter of an hour, just over the neuralgic tract. The application of a very hot sponge would always allay the itching, but till the paroxysm passed away it would shift to another nerve, and being driven from this it would fix on a third and so forth. With the attacks of itching he had occasional but not at all severe shooting pains in the regions affected with the itching.

Now it may be said that during the neuralgia, the nerves, or more probably their centres, were in an excitable condition, so that a normal sensation was felt as pain. But this interpretation will not explain the terrible itching; here there must have been a different molecular arrangement in the nerve-centres. I submit that the evidence tends to show that the pain was also due, not to an excitable condition, but to an altered molecular arrangement, and that the molecular arrangement again underwent a change concomitantly with the onset of the painful itching.

I may refer to Dr. Anstie's well known argument in favour of the view just advanced. If pain is due to an excitable condition of the nerve or its centre, natural sensation should be heightened over a neuralgic tract, whereas the opposite condition is often observed, the normal sensation in the neuralgic territory being in many cases greatly blunted.

If then, bating the foregoing exception, change in the nucleus must occur in every case of pain, how does one painful disease pain due to the exalted condition of the irritated nerve, so that a slight irritation may cause it to transmit a very powerful impression; a fact clearly shown in a case recorded by Dr. Anstie, where injury of the left great occipital nerve caused neuralgia in the fifth, and where the slightest pressure over the damaged nerve induced very severe pain in the forehead and face, although the pain at the point irritated was not greater than would have occurred in health, showing that the impression conveyed along the injured nerve was by no means great, or considerable changes would have been produced in its own nucleus with corresponding pain, and yet the impression was adequate to excite severe pain in many branches of the fifth. This case, too, proves conclusively, that the seat of neuralgia is not inherent solely in the nerves but depends on the condition of the nervous centre, for were only the nerves at fault, the neuralgic pain should be felt in the diseased nerve itself—not in the territory supplied by another nerve. This want of isolation of molecular change to the portion of the nucleus in nervous connection with the part producing it—this diffusibility of molecular change—must be due to some altered condition of the nervous centres. This defect is common to other diseases allied to neuralgia.

Thus, to sum up, we have seen that a diseased tooth, bone or other irritant, incites molecular changes in the nucleus of the affected nerve, producing the sensation pain; that owing to a defect, the nature of which has hitherto remained undetected, the influence extends beyond the part of the nucleus in connection with the affected nerve, so that the molecular alteration involves a greater part or the entire nucleus, so that pain is referred to parts supplied by unaffected nerves. Indeed, the influence of the irritation may extend beyond the nucleus of the nerve to neighbouring parts, and these, exciting molecular changes, may produce distant motor or vaso-motor and trophic changes. Thus a diseased tooth, etc., may cause molecular changes in the whole nucleus of the fifth, producing pain referred to every branch of that nerve, nay, the influence may extend and involve the nucleus of the seventh nerve inducing spasm of the facial muscles. Further, it is well known that various nutritive changes may occur at the seat of the referred pain, showing that an influence is propagated, either along the sensory or trophic fibres from their nucleus, to the periphery:

thus over the seat of referred pain, various changes occur; the hair may turn grey, or become coarse and brittle; the skin become altered, or even inflamed, and assume an appearance much like erysipelas (Anstie); or the eye may become inflamed; or the retina diseased, so as to damage the sight.

The influence of the nerves is supposed to be shown in the case of herpes zoster. Here the patches are seated along the course of an intercostal nerve, the patches and vesicles having even their long measurement in the direction of the nerve. The same thing is sometimes observed in other rashes like psoriasis. In these cases the rash is supposed to be produced by some alterations in the nerve. I think another view may be plausibly maintained, that the nerve does not produce the rash, but only determines the direction it shall assume. This is certainly the case with some rashes, as for instance, that of chicken-pox. Though the rash is without doubt due to a specific poison, still the vesicles and the patches of redness around them are influenced by the intercostal nerves. Thus on the face, extremities, back and front of the body in the middle line, the vesicles and the attendant redness are round, but on the sides of the chest and abdomen, both the vesicles and the redness are oval, the long axis of the vesicles and patches of redness running in the direction of the intercostal nerves, being quite athwart the chest above, but oblique at its lower part Now in these instances it can hardly be claimed for the nerves more than hat they determine the shape and direction of the vesicles and the redness.

It is rather a curious circumstance, that during the continuance of the neuralgia, whilst the original irritant is in operation, various minor influences will excite paroxysms of pain. In neuralgia from a diseased tooth or diseased bone, etc., irritation of other branches of the fifth, will produce a paroxysm, even a breath of cold air on the face, or the touch of an object. In each case the paroxysmal excitants are few in number, though cold air may bring on a paroxysm, perhaps pinching or other irritation of the same spot is inoperative. On removing the primary cause of the neuralgia, the attack ceases, and then irritation of other branches also fail to induce a paroxysm.

We have just seen that during an attack of neuralgia, the paroxysms are induced, at least in many cases, by only a few irritants. Thus, in some cases, hot things in the mouth always excite a paroxysm, in others only cold things; again, in some instances a breath of cold air on the face brings on a paroxysm, whilst in others cold air relieves and warmth excites the pain, yet any other kind of irritation to the same nerves, produces a natural sensation and no pain, and is felt only over the seat of application. It thus appears that only certain, and often a very limited number of impressions, peculiar to each case, can induce that molecular change, which diffusing itself through the nucleus causes the paroxysm of pain, whilst other impressions induce only natural molecular changes, exciting normal sensations felt merely at the point of contact. This fact is strikingly illustrated, by the difference between the effect of aconite and the impact of cold air. A breath of cold air will raise a severe paroxysm felt throughout the territory of the nerve, whilst the aconite will excite tingling restricted to the area of its application, not distributed throughout the neuralgic tract; showing that the nucleus does not allow all molecular arrangements to spread throughout it, but those only of a certain character, varying in different cases. It may be said, that the impressions producing the paroxysm, are stronger than those which induce only a local and natural sensation, but this cannot be so, for, in a case of neuralgia, the slightest exciting agent may be sufficient to produce the pain, whilst powerful irritation will not as a rule induce a paroxysm, but only characteristic sensation of the irritant at the point of contact, though in some severe cases, almost any irritant applied over the terminations of the nerve will excite the paroxysm.

In those cases therefore, where only certain kinds of irritants like cold or heat, will induce the paroxysm, other applications like rubbing or pinching, or the application of irritant agents will excite simply their own characteristic sensation at the point of contact. It appears that one of two views is open to us:—either from some alteration in the nerve, an impression capable ordinarily of exciting a natural non-painful sensation, induces, in its stead, morbid molecular changes, and these travelling to the nucleus elicit there similar changes which excite pain, and, (through defect of the nucleus), extend beyond that part in connection with the irritated nerve:—or, it may be, from a disordered harmony between the nerve and its nucleus, certain natural molecular combinations produce a different and abnormal one in the nucleus; in fact a painful molecular arrangement. In other words—Is the disease in neuralgia confined to the nucleus, or is the nerve likewise affected, so that, in the nerve itself, certain impressions produce unusual, painful, molecular arrangements?

At first sight it might appear that those cases where injury of one nerve produces neuralgia in another not anatomically related to it, as for instance, where injury of the ulnar causes neuralgia of the fifth* and disease of the great occipital, trigeminal neuralgia, might assist us in settling this question. Thus where pressure or other irritation on the wound of the ulnar nerve excites a severe paroxysm in the fifth, it may be argued that the impression must produce an abnormal molecular arrangement in the ulnar nerve itself, and that only this particular arrangement is capable of exciting pain in the fifth, for if irritation of the ulnar nerve excited only a natural molecular arrangement, we certainly should expect that the identical application to the branches of the fifth nerve would induce a paroxysm; but this expectation is unfulfilled, for whilst pressure on the ulnar wound will excite the paroxysm, pressure on the terminations of the fifth nerve produce no such result. On the other hand it may be said that if the impression on the cicatrix of the ulnar nerve induces an abnormal and painful molecular combination which excites an identical arrangement in the nucleus of the fifth, yet surely the impression would excite a corresponding arrangement in its own nucleus and produce pain in the region of the ulnar nerve; but this is not the case, as the impression on the ulnar nerve is felt in a natural degree. The foregoing question therefore cannot at present, I think, be answered, but its non-solution does not affect the proposition concerning the power of local applications in neuralgia to modify the central molecular arrangement. To this subject, after the preceding rather long digression, I now turn to attempt first to show that:—

By "local applications" to the trunks or to the ends of nerves we can prevent the pain-giving molecular arrangement of the nucleus.

In the previous section we saw that in neuralgia, and probably likewise in asthma, in megraine and in epilepsy, there is an affection of the central nervous system whereby the impression made on the nucleus spreads itself through or beyond it; and thus the nucleus, under certain irritation, is liable to assume a painful molecular arrangement. This arrangement and consequent attacks of pain are generally, if not always, brought on by a distant local irritation conveyed to the nucleus. Experience shows us that this morbid process often takes place, and we may fairly conclude that it probably always takes place, for it is difficult to understand how any change in the condition of the central nervous system from static to dynamic can take place spontaneously. The change must be brought about by the effect of "irritation," conducted to the nucleus. No doubt the proneness to an attack varies, and with neuralgia, epilepsy, asthma, and megraine, it often happens that during a long interval between the seizures, the facility with which the dynamic changes take place in the nervous centres becomes intensified, so that a very slight cause will precipitate an attack. By removing the irritation, as by getting rid of an irritating tooth in neuralgia, the paroxysms of course subside, but the central condition remains unaffected. These cases then we treat by searching for the exciting cause, and when this is undetectable or when though detectable, irremovable, local applications will yet do much good, sometimes will remove the irritating cause, but oftener by influencing the central nervous disease. Among the numerous examples of the efficacy of local applications in checking the pain of neuralgia we may instance galvanism and aconitia. Galvanism induces in the nerves an altered molecular arrangement, which, travelling centrally, excites in the nucleus a corresponding condition which effaces the molecular arrangement giving rise to the sensation of pain, and substitutes for it the galvanic sensation; and aconitia will in like manner produce a peculiar and characteristic molecular change, which, replacing that present in the nucleus, will change the pain to a tingling sensation.

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* Neuralgia of the fifth affords sometimes an illustration of a nerve causing neuralgia whilst it is not itself the seat of pain, for we often meet with facial neuralgia due to decayed teeth, though about the teeth themselves there is no pain nor tenderness.

It is sufficient in most cases to apply the galvanism or the aconitia, &c., over the seat of greatest pain.

The molecular changes so induced will abolish the painful molecular arrangement throughout the nucleus and thus arrest pain in parts beyond the area over which these agents have been applied. The tingling of the aconitia or the galvanic sensation is felt only at the part of contact, not over the whole of the painful tract, shôwing that, whilst controlling the painful molecular arrangements throughout the whole or greater part of the nucleus, the topical agent itself induces only its own peculiar molecular arrangement in that part of the nucleus in direct connection with the nerves to which it is applied; affording thus a good illustration of the fact, already noticed, that only certain impressions (molecular arrangements) have the power to diffuse themselves through the nucleus, in other words, to excite the paroxysmal pain.

In some cases, however, the pain-exciting conditions are more powerful than the effects produced by the local medicinal application. It may happen that disease of the nerve, or in the immediate neighbourhood of the nucleus, or an impression conveyed by a nerve unconnected with the nucleus, may predominate over the effect of the local medication, when the pain will remain unaltered. The local agent is then imperfectly felt or is entirely unfelt, or it may even increase the pain; thus it is well known that, unless it can suppress the pain, medication over the territory of a painful nerve is very imperfectly felt, though it must be admitted that impressions on the terminations of a painful nerve are appreciated, though imperfectly. In a paroxysm of severe neuralgia the tingling produced by aconite can be discriminated even at the seat of pain, at least so say patients, though they may be in error and may attribute the tingling in a neighbouring twig to the implicated region. It is probable, however, that impressions can be felt even over the seat of pain.

Now as it is impossible that the same molecules should simultaneously assume different combinations, it follows firstly, either that over a painful region all the tubules of the nerves and their corresponding part of the nucleus are not affected, that in fact part of the molecules of the nucleus are so arranged as to produce the sensation of pain, whilst the rest of the nucleus remains in this way unaffected but becomes influenced by the local applications; or secondly that different molecular arrangements follow each other in rapid alternation along the same nerve and are appreciated, but the intermissions, being so rapid and brief, each sensation seems continuous. The local application by removing the central condition causing the neuralgia, of course prevents those secondary effects of neuralgia, which have been fully described, and thus I have shown that "local applications may modify or remove disease of the central nervous system and so remove or lessen the effects of the disease at a distant part."

Asthma.—The following remarks are applicable only to those forms of asthma due to affection of some part of the nervous system. Asthma affords many instances of a distant local irritation exciting through the nervous system strong contraction of the circular fibres of the bronchial tubes. These local exciting causes may act through part of the nucleus of the pneumogastric nerve, or as Dr. Hyde Salter has suggested through the pulmonary ganglia, the affection being seated in some instances in part of the pneumogastric nucleus, in others in the pulmonary ganglia. When food, constipation, or uterine derangement, excite the paroxysm, the local effect must be transmitted through the pneumogastric nucleus. Even in bronchial asthma, the pneumogastric nucleus is probably affected rather than the pulmonary ganglia, for in this instance food aggravates the spasm and even induces it, though it must be considered that bronchitis produces the disease itself, for this being absent, food does not tighten the breathing.

The effect of distant irritation in asthma, shows itself only in muscular contraction of the bronchial circular fibres. Probably, the afferent fibres and the nucleus can assume a great variety of molecular conditions, but no matter how numerous, each will produce only this particular muscular contraction. Through any change from the static to the dynamic state of the nucleus, nervous force will pass along the afferent nerves and expend itself on the muscles to which the nerves are distributed and cause them to contract.

In asthma as in neuralgia the anatomical change must be of a kind so subtle that we cannot at present expect to detect it in the diseased nucleus, which must still retain its organization sufficiently to undergo molecular changes in response to the nerves, for if the nucleus were disorganized these irritants would produce no effect on it and there could not result any spasm of the bronchial tubes.

There is in asthma, apparently, not abnormal, but simply excessive action, the nucleus being excited into undue action either by causes which produce but little spasm, or by causes which in health produce no spasm at all. Thus, in bronchial asthma, a mild attack of bronchitis is sufficient to induce powerful spasm, and as the bronchitis is general, a more increased susceptibility of the nucleus, whereby a slight excitant producing excessive action may constitute the whole disease. In other instances, however, an impression conveyed to the nucleus diffuses itself, and involves other parts of the nucleus. From the ingestion of food, or the presence of a fæcal accumulation, or hepatic derangement an impression is conveyed to the pneumogastric nucleus and thence extends until it involves the nucleus proper to the lung. Indeed, strange to say, the effects are reflected solely to the lungs, and not back to the stomach, nor, as a rule, to that part of the nucleus appropriated to the heart, though in some cases food may induce palpitation or irregular action, in which case the lungs are usually unaffected. Thus we see that the diffusibility of the afferent impression, as in neuralgia, constitutes, at least in many cases, a great part of the asthmatic affection itself.

The local causation of asthma through the nervous system is well exemplified in cases where the paroxysm is induced by food, constipation, uterine derangement, emotion, and in the singular case narrated by Salter where cold applied to the instep always provoked a severe attack of asthma.

It is an interesting and important practical question whether the disease is situated in the pneumogastric nervous centre only, or whether there is likewise an affection of the nerves, which enables them to propagate and convey the particular impression competent to excite the paroxysm. There are reasons for thinking that in some instances there is a special condition of the nerves: thus in the curious instance just mentioned where cold applied to the instep excited an attack, the cold would seem to have produced a peculiar molecular arrangement in the nerves competent to excite the paroxysm; for if the impact of cold excited the usual change in the afferent nerves we should expect that cold applied to other parts of the body would equally excite the paroxysm, for between the afferent nerves of the feet and the pneumogastric nucleus there is no more connection than between it and the other superficial afferent nerves of the body.

In many cases only a particular kind of impression, or molecular change in the same nerve, will excite the paroxysm; in some cases ipecacuanha or hay will excite a peculiar kind of irritation of the mucous membrane which induces changes in the nerves capable of exciting the nucleus to the production of a paroxysm, whilst other kinds of irritation as that from bronchitis, from cold, &c., fail to induce a paroxysm.

Megraine.—I shall have occasion to speak of megraine much more concisely than of neuralgia, since many of the comments on neuralgia and asthma are equally applicable to megraine. Like neuralgia and asthma, there is in this disease an affection of the central nervous system, which, so to speak, remains dormant till roused into action by some "irritant;" that is the affected centres exist in the static till stimulated into the dynamic condition. Owing to the great variety of exciting causes, operating differently on different persons, changes take place in a large tract of the central nervous system, the extent varying in different individuals; thus, these changes may commence in the centres for sight, then radiate to the intellectual centres, the centres for speech, and passing downwards and backwards, involve at length the nucleus of the fifth nerve and the centre for vomiting. The symptoms of course will depend on the regions affected; when the centres for sight are implicated there will be spectra, &c.; if the intellectual centres, then depressed mental activity; the nucleus of the fifth nerve produces supra-orbital pain; and the nucleus for vomiting excites nausea and sickness. These are the parts most frequently involved.

The distant effects produced by local conditions, generally supra-orbital pain and vomiting, are well exemplified in an attack of megraine which may be excited by intellectual or emotional excitement, by straining the eyes, by indigestible food, by derangement of the liver, constipation, the catamenia, and by derangement of the womb.

Whilst on the one hand central changes will produce distant effects, so on the other hand the influence of local medicaments in correcting the central affection, and so controlling the attack is very manifest. On the commencement of the attack aconitia or veratria ointment rubbed over the seat of referred pain, that is over the brow, will relieve the pain and restrain the further extension of the central changes, and will prevent or check vomiting.

In megraine accompanied by derangement of the stomach, bowels or liver, it is often said that it is useless to give medicines to act on these parts, since these disturbances, which occur only during the attack, are produced by the affection of the central nervous system; but if local applications to the seat of the pain itself will arrest both this pain and the concomitant intestinal derangements, there is no reason why remedies which may affect the termination of the other sympathising nerve, namely the pneumogastric, should not modify the change in the nervous centre likewise, so as to control the supra-orbital pain. In fact, I have no doubt that in certain cases, remedies which correct the gastric, hepatic or intestinal derangement (see Podophyllin), will *considerably curtail* the paroxysm.

The influence of local applications on the central nervous system, is well illustrated in some cases of epilepsy preceded by an aura. Here a local application to the seat whence the aura apparently departs, arrests the threatened epileptic attack. It may be objected that the aura starts from the extremity of the nerve and travelling to the brain excites the epileptic paroxysm, and that the local application by arresting the aura prevents the exciting cause of the epileptic attack; but I believe it is now very generally held that the aura itself depends on central changes, and that the peculiar sensation, as of some impression travelling up to the brain, must be included in the category of referred sensations.

We may thus concisely summarise the preceding somewhat discursive argument:—

The central nervous system exercises a constant control over nutrition and secretion.

The nervous system does not merely increase or lessen secretion and nutrition, but modifies multifariously their chemical (molecular) changes as is well exemplified by the manifold influence of neuralgia on nutrition.

By means of agents applied to the periphery we can produce in the central nervous system changes similar to, or identical with, those which take place in neuralgia, and inferentially we can probably, in a similar way, influence nutrition and secretion.

The nature of the change in the central nervous system differs according to the nature of the topical application, and so its influence on nutrition and secretion will vary, leading us to hope that we may hereafter be enabled to select a special topical agent adapted to the precise distant effect on nutrition or secretion we may desire to produce even on the healthy nervous system. In disease of the central nervous system, we can also influence distant nutrition and secretion, for in many nervous affections, these functions become much modified or even suppressed.

These effects, resulting from morbid central changes, topical agents, through their impression on the afferent nerves, will diminish and sometimes even eradicate. Neuralgia, asthma, megraine, and epilepsy are notable examples of disease in which the modifying and distant influence of topical agents on the central morbid affection is abundantly manifest.

Cantharides applied to the surface of the body, soon excites tingling, smarting, and a sensation of heat; the papillæ of the skin quickly become reddened and raised; next, in a variable time determined by the strength of the application, on these papular elevations minute vesicles form, which gradually enlarge, and by their lateral extension soon coalesce, so as to form blebs of various sizes, filled with a fluid rich in albumen, and generally containing some fibrine.

It is of great importance to bear in mind that the effects of these applications are very different according to whether extensive vesication is produced or simply reddened skin, with the formation of a few small miliary vesicles. Dr. Graves insisted on the different and even opposite effect of blisters, according to the degree of their action. The primary action of a blister is that of a stimulant to the body generally, and to the individual organs in whose neighbourhood it is applied; but if allowed to remain long enough to produce much vesication, and to form large blebs, it depresses the bodily powers in proportion to the amount of serum withdrawn from the vessels, and so lost to the system,—a lowering effect often exemplified in weakly people, who through the abstraction of serum are apt to remain weakened for several days. As the serum of blisters contains almost as much albumen as the blood itself, we might as well bleed the patient to the same amount.

Should it be held desirable to reduce somewhat the patient's strength and to produce simultaneously a counter-irritant effect on any of the individual organs or tissues of the body, then a blister may be applied, even to vesication; but as the good effects of blistering are for the most part insured by a milder measure, treatment so energetic and so depressing is seldom called for.

Dr. Graves commonly employed blisters as a general stimulant in certain critical conditions. In acute diseases, as the idiopathic fevers and inflammations, a patient sometimes already much prostrated, drifts into a dangerous, apathetic, and unobservant state, which goes on till it reaches even partial insensibility or coma, so that he can be roused only with difficulty, and then wears a stunned, stupid, vacant aspect, understanding very imperfectly what is said to him. With this depressed mental condition the body generally sympathizes, its functions becoming more and more languidly performed, till those necessary to life altogether cease. It is a condition which may be compared, not inaptly, to that produced by opium poisoning, where the partial coma produces a lethargy in the functions of the body, their activity diminishes as the coma continues and deepens. Now a patient in the partially comatose state of which we are speaking, gets no true and refreshing sleep; yet sleep is urgently needed, and an opiate and plenty of stimulants carefully given, often produce a refreshing slumber, out of which the patient wakes strengthened and much improved. (Sėe Opium). When the functions are very languidly performed this blistering treatment may well precede the use of opium.

In this precarious condition, it is essential to rouse the patient from his lethargic state. This accomplished the bodily functions will act with renewed force, and he will pass from imminent danger to comparative safety. Large blisters or mustard poultices should be applied for a short time in quick succession to various parts of the body; for instance, to the chest, the abdomen, and to the thighs and calves. The great value of flying blisters in these circumstances will be the better appreciated if we bear in mind that the critical condition just described generally occurs near the end of an acute illness, when, if the patient can be kept alive for one or two days, the near danger of death passes away, acute diseases having a definite duration, so that if the patient can be sustained to this point his life may be saved. Counter-irritants by rousing the patient, and spurring the flagging vitality, may rescue an almost hopeless life.

Preparations of cantharides may be applied as stimulants of special parts of the body; for instance, when with a general condition like that just described, there is fear of hypostatic congestion of the lungs, or of pneumonia, in which such congestion often ends, flying blisters applied to the chest, and perhaps, as recommended by Dr. Graves, along the course of the pneumogastric nerves, may brace up the vessels, and avert a serious and often fatal complication. Or we may stimulate the heart, and in intense weakness strengthen its contractions for a short time, by flying blisters or mustard poultices placed over the precordial region, and then maintain the advantage thus temporarily gained by the free administration of alcoholic drinks.

Flying blisters are largely employed in various diseases of the deep-seated organs, as pleurisy, pneumonia, asthma, biliary and renal colic, &c.

Blisters are frequently employed in pneumonia and pleurisy. Yet great divergence of opinion exists, not only as to the stage of the disease in which they are useful, but even as to their utility in any case. Some maintain that during the febrile stage blisters increase the fever; but the increase, if any, certainly must be very slight, for I have not been able to excite fever in fever-free persons by blistering, nor have I ever seen it increase a fever already existing. The advocates of blistering in pneumonia maintain that it removes pain, quiets cough, and lessens expectoration; but many competent authorities discredit the efficacy of blistering in this inflammation.

Whatever doubt may exist as to the influence of blistering in acute pneumonia and pleurisy, most observers agree that it lessens the pain, and must therefore benefit the patient by subduing the restlessness, oppression and sleeplessness consequent on pain. In estimating the effect of blistering, it must, be recollected that in these acute affections the severe pain is of short duration, and spontaneously lessens or disappears in about forty-eight hours. It is, perhaps, not superfluous to recaution against too free vesication.

Opinion is more agreed on the usefulness of counter-irritation in pleurisy, after the subsidence of inflammation and fever. At this stage, the prompt application of large flying blisters, often repeated, and quickly healed, further the absorption of the fluid in the pleural cavity, and lessen the risk of the disease remaining indefinitely chronic. The counter-irritant, we have said, should be frequently applied, and the vesication, if it occur, healed at once; for all the good of counter-irritation is effected during the first few hours while it stimulates the skin. The notion that, free vesication and the maintenance of the discharge by irritating ointment, will drain off the fluid, as it were, from the water-logged pleuræ, is altogether fallacious. This barbarous treatment drains important nutritive material from the system and weakens the patient when strength is most needed. We have already referred to the fact that blisters will redden and even inflame the pleura. Many consider counter-irritation worse than useless when the pleural effusion has lasted a long time. The production of a free discharge of serum is no doubt useless; but, although in a long-standing case of effusion there is but slight chance of improvement by any treatment, yet mild flying blisters will in some cases help to the absorption of the fluid, and at any rate may prove serviceable, if in no other way, by removing the troublesome intercostal pains which often accompany chronic pleurisy, although a mustard poultice is to be preferred.

Counter-irritants are often of signal service in removing the oppression of the breathing in asthma, especially of bronchitic asthma, and the shortness of breath, accompanying bronchitis with emphysema.

They relieve the pain arising from the passage of renal and biliary calculi.

Counter-irritation is useful in many other diseases, as phthisis, phlebitis, sciatica, facial paralysis, gleet, leucorrhœa, rheumatism, gout, and pleurodynia.

Counter-irritation is very beneficial in certain forms of phthisis. In the acute and rapid forms it is of little other service than to remove pain. But when the disease is chronic, when we have to treat what is now called the fibroid lung, when the cough is paroxysmal and violent, or frequent and distressing, preventing in either case rest and sleep, active counter-irritation of the chest, corresponding to the seat of the disease, often quickly quiets the cough, greatly diminishes the profuse expectoration, and thus obviates a severe drain on the strength. In blistering these weakly patients, vesication must be avoided or the exhaustion produced by the loss of serum may be so great as even to endanger life. In phthisis iodine liniment is a better counter-irritant than blisters.

In inflammation of the superficial veins a blister applied over the course of the inflamed vessel reduces the inflammation, hastens absorption or liquefaction of the coagulated blood, and assists the restoration of the circulation through the obstructed veins.

Blistering is of the greatest service in neuralgia. A flying blister to the temple or behind the ear generally relieves frontal or facial neuralgia. The obstinate form of facial neuralgia dependent on a diseased tooth, rebellious to all treatment except extraction, often yields to a blister; the neuralgic pains ceasing, although the toothache may continue. Blisters relieve the shifting neuralgic pains common in nervous sensitive women, although the pain is apt soon to fix upon another nerve; but flying blisters will drive it from place to place. In this migratory form the pain may alternate between a few, or may affect in succession most of the nerves, producing in addition to pain great cutaneous tenderness, or the nerves supplying the viscera may be affected and without pain produce functional disturbance, as nausea, sickness, diarrhœa, &c. This form of neuralgia, though it s right to say the disease lacks many of the more distinctive characters of neuralgia, is most difficult to cure. The obstinate intercostal neuralgia left by shingles, occurring mostly in old people, generally yields to blisters. Anstie points out that blisters applied over the seat of pain aggravate the suffering: "but, on the other hand if they are applied to a posterior branch of the spinal nerve trunk from which the painful nerve issues, a reflex effect is often produced of the most beneficial character."

Blistering paper, although mild in its action, requiring to be applied some hours, generally produces enough irritation to relieve facial and frontal neuralgia; but, if the pain continue unabated, a stronger preparation of cantharides should be tried.

Blisters are of the greatest service in sciatica.* They should be applied every day or second day in the neighbourhood of the sciatic nerve, reaching in severe cases from the buttock to the knee. Free vesication sometimes succeeds where slight vesication fails. Other counter-irritants are useful in neuralgias, as mustard poultices, croton-oil liniment, iodine paint; but cantharides is superior to them all.

Blisters behind the ear, and especially to the temple, are very useful in rheumatic, gouty and simple inflammation of the eye; relieving pain quickly, and subduing inflammation, though less rapidly. As it is important to repeat the application frequently, blistering paper is preferable to stronger preparations. Obstinate forms of tinea tarsi sometimes yield to repeated applications of flying blisters to the temples. Counter-irritation, by blistering fluid or croton-oil liniment behind the ear, often removes earache.

Counter-irritation at the epigastrium often allays pain and obstinate vomiting, due to disease of the stomach.

Mr. Furneaux Jordan employs counter-irritation to remove enlarged glands. "In enlarged glands, in abscess, carbuncle, boils, erysipelas, the best locality for the counter-irritation is around, or adjacent to, the disease. Blisters or iodine may be employed." "In enlarged cervical glands a large patch of iodine irritation at the back of the neck, which may be prolonged below the glands, will certainly prove successful in a short time."

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* The most obstinate forms of sciatica are sometimes benefited by the insertion of a needle for an inch or more in one or two places along the course of the sciatic nerve. More relief is sometimes obtained by allowing several needles to remain imbedded in the tissues for half an hour or even longer.

Dr. McCall Anderson recommends blistering in erythematous lupus, and in chronic skin affections, especially in eczema of the hands, when the tissues thickened and cracked, hinder free movement.

In paralysis of the seventh nerve, dependent on alterations in its periphery, from draughts or cold, painting the skin over the paralysed muscles with blistering fluid will in some cases quickly remove it. The earlier the application, the greater the probability of good results.

A blister applied to the perinæum and along the course of the urethra will sometimes cure a gleet obstinately rebellious to all the usual methods.

Blisters are of the greatest service in rheumatism. Large flying blisters, applied in proximity to an inflamed and painful joint, often quickly remove the pain, and with the ease thus brought about sleep often ensues, and a concurrent general improvement takes place in the patient's condition. But blisters have been of old recommended as the sole or chief treatment of acute rheumatism, and some apply them, to the extent of free vesication, with the unfounded hope of removing from the blood the poison on which rheumatism is supposed to depend. This method has the disadvantage of reducing the strength of the patient in proportion to the quantity of serum lost, the depletion tending to prolong the attack, and to retard the convalescence, usually sufficiently tedious, after a severe attack of rheumatic fever, which induces more anæmia than most other diseases. The advocates of free vesication assert that this method moderates and shortens the attack, and lessens the danger to the heart; and some attribute its efficacy to the influence large blisters have on the urine, changing in a few days the acid urine of rheumatic fever to a neutral or even alkaline state. I think that due regard is not paid to the great influence age exerts on the duration of an attack of rheumatic fever; moreover, the reported cases appear not to have recovered more speedily than frequently happens in persons of the same age, and manifesting the same body temperature, who recover without any medicine.

The nightly application of a flying blister greatly relieves the pain and swelling of chronic and subacute gout, gonorrhœal rheumatism, and chronic synovitis; but if this mild application fail, strong vesication should be tried.

Pleurodynia usually yields to anodyne liniments or mild counter-irritants, but sometimes strong vesication is necessary, although the weakening loss of serum may increase the pain for a day or two.

The active principle of cantharides being soluble in oils it is useful to smear a little simple oil over preparations of cantharides. The oil, moreover, helps to maintain the plaster in contact with the skin.

It must be borne in mind that blistering paste and blistering paper require several hours to produce a blister, and that the paper rarely produces much vesication. If a speedy and sharp action is necessary, we must employ blistering fluid, which sometimes vesicates in twenty minutes to half an hour.

The active principle of the Spanish-fly may become absorbed by the skin, in sufficient quantity to produce congestion of the kidneys, strangury, and its other characteristic toxic effects; hence, in the treatment of acute or chronic Bright's disease, cantharides should be avoided, as we are unable to regulate the quantity which may be absorbed, and a damaging amount may be taken up by the skin.

We hope it has been made sufficiently plain that, in the great majority of cases, preparations of cantharides should not be applied long enough to cause much vesication. The vesicles should not be opened, but be covered with a layer of soft cotton wool, till the effused serum is absorbed, when a superficial desquamation follows, and no troublesome consequences need be apprehended. If blistering is carried far enough to produce large blebs, the serum will not become absorbed, and the bleb will at last burst; even in this case it is not advisable to open the blister, but to allow the under-lying dermis first to heal partially, when no ulceration need be feared. If the bleb is punctured, the air will perhaps irritate the raw surface, producing much inflammation, which may end in an extensive slough, an untoward event, especially apt to follow the blistering of young children or old people, or persons with broken down health, as the victims of Bright's disease, &c. Hence, in such cases, it is generally considered advisable to use other counter-irritants. (*Vide* Mustard).

OXYGEN.

Oxygen as yet, is but rarely employed in medicine. Further experimentation may perhaps show that it is a valuable therapeutical agent, but at present the evidence to this effect is lacking. It has been recommended in the non-febrile forms of phthisis, and is said to be of especial service in derangement of the stomach of phthisical patients. In inflammatory fevers and febrile phthisis it is said to increase the fever and to favour hæmoptysis.

According to Beddoes and Demarquay, it is useful in asthma; but they disadvise the use of oxygen if heart-disease co-exists with the asthma.

In anæmia, from loss of blood or from suppuration, oxygen according to some, increases appetite, stimulates digestion, and improves the strength.

Demarquay asserts the remedial power of oxygen over some forms of diabetes, and states that by means of this agent he has reduced the sugar in the urine by one half, the diet remaining unchanged.

This gas is useful as a local application to atonic painful sores, but produces no effect on healthy sores. Administered as a gaseous bath for an hour or longer at a time, and repeated six or eight times a day, it is said to be of the greatest use in senile gangrene, changing the livid red to a rose colour, restoring warmth to the tissues, renewing sensation, mitigating pain, checking the disease, and sometimes even curing it.

PEROXIDE OF HYDROGEN.

Peroxide of Hydrogen has been used both internally and externally. It whitens the skin or mucous membranes, and excites a pricking sensation, and, in delicate structures, as the conjunctiva, induces a slight degree of inflammation.

According to Dr. Stöhr, on adding peroxide of hydrogen to venous blood, pretty active effervescence occurs. The solution soon becomes yellowish red, then pale yellow, and in five or six minutes from the beginning of the experiment, colourless, and afterwards a white flocculent coagulum settles. The corpuscles themselves, when treated with a strong solution, become irregular in outline, and do not form rouleaux. Added to pus, much gas is given off, and the mixture becomes turbid with white flocculi, and many of the corpuscles are shrunken or altogether destroyed.

Applied to abraded surfaces, covered with blood or pus, the solution of peroxide behaves in the manner above described, the surface becomes ultimately covered with a thin layer of coagulated albumen. The solution, it is said, will heal a chancrous sore in half the ordinary time. The sore is to be washed with a solution three times a day, and to be continuously covered with lint moistened with it. Open buboes, too, have been treated successfully in the same manner. The solution is said to destroy the specific character of a chancrous sore.

Internally administered, it is reputed to be a disinfectant and a slight stimulant.

CARBON. ANIMAL CHARCOAL. WOOD CHARCOAL.

Carbon, in proportion to its porosity, absorbs many gases in considerable quantity; and wood, being more porous than animal charcoal, its absorbability is greater.

Charcoal does not absorb all gases in an equal degree; it will absorb but little hydrogen, though it will imbibe a considerable amount of oxygen, a large quantity of sulphuretted hydrogen, and a still greater proportion of ammonia. Charcoal is much used on account of this property as a disinfectant, to remove bad smells, or to prevent the air in rooms becoming contaminated by the effluvia from foul ulcers. Its non-volatility renders it very inferior to chlorinated lime or chlorine gas and other agents for purifying air, since it can act only on the air in immediate contact with it.

It is more effectual in absorbing the offensive gases given off by foul sores, and is employed in the form of a poultice, mixed either with bread or linseed-meal. Bread, being more porous, is to be preferred, as it permits the gases to permeate the substance of the poultice, and so to come in contact with the particles of charcoal.

After becoming thoroughly moistened and its pores filled with water, it may reasonably be doubted if the charcoal does not lose its capacity to absorb gases and so to act as a deodorizer. It is certain that charcoal poultices often fail to act in this manner. Charcoal may act by preventing decomposition, for, when swallowed after admixture with water, its pores being thus filled or obstructed, it will still prevent flatulence, an effect not due to absorption; it must, therefore, act by arresting fermentation or decomposition. A thoroughly efficient mode of employing charcoal, is to fill a small flat muslin bag with it, in a finely granulated form, and to place it over the poultice covering the sore.

Charcoal poultices are reputed, on doubtful grounds, to clean and heal sloughing or gangrenous wounds.

How does charcoal destroy smells depending on noxious gases? It has been stated in a previous page that it is endowed with the property of condensing many gases in its pores, and some accept this fact as a sufficient explanation of its action. Others assert that the oxygen condensed and accumulated in the pores of the charcoal, combining with the other gases with which it comes in contact, breaks them up and destroys their ill odour.

A question of more practical importance is whether the carbon becomes inert by use, thus losing its property to condense gases or to destroy them. Buchheim is probably right in stating that the carbon becomes inert, but others assert that if kept dry, it will retain its properties unimpaired for many years. At all events exposure to a dull red heat restores its gas-absorbing power.

Charcoal is likewise employed as a disinfectant, and Dr. Stenhouse has ingeniously devised a charcoal disinfecting respirator, which, no doubt, will protect the wearer against many gases, but at present no evidence exists to show that charcoal will destroy the organic matters which propagate disease, although, acting like a filter, it may prevent their entrance into the system.

Charcoal, by its chemical or mechanical action, possesses the property of carrying down from solutions many colouring matters, many bitter substances, alkaloids, and mineral substances. Hence Dr. Garrod advises its administration in poisoning by corrosive sublimate, arsenic, morphia, strychnia, belladonna, etc., but, at present, this treatment has not found much favour with the profession. As it is said, that half an ounce absorbs only one grain of alkaloid, large doses of half an ounce to an ounce, or even more, must be given. Charcoal also precipitates the colouring matter of urine, carrying down at the same time all the uric acid, and some of the urea in solution. The sugar of diabetic urine is unaffected by charcoal. As a precipitant, animal charcoal freed from its earthy impurities is found to be the most efficacious, on account, it is said, of its more finely divided state.

Charcoal is employed with much success in certain diseases of the stomach. It is said to ease the pain of chronic ulcer, and of neuralgia of the stomach, possibly by checking fermentation and so preventing the formation of acids which must irritate the stomach, especially when ulcerated. It is markedly useful in flatulence. In the majority, if not in all cases, intestinal flatulence is the result of gases generated by fermentation. The symptoms accompanying flatulence, however, are not always alike, and their various complications afford indications for treatment. Sometimes "the wind" is produced in enormous quantities, with great rapidity, producing distention, eructation, and mental depression, the patient complaining only of these symptoms, not of pain nor of acidity. This enormous production of wind, irrespective of other symptoms, prevails chiefly among middle-aged women, especially at the change of life. This condition is met with sometimes during pregnancy and suckling, and seldomer in the course of phthisis. It is often very difficult to check the formation of wind, but vegetable charcoal is one of the best remedies. Sometimes after a few mouthfuls of food the wind is formed in quantity so large that the patient is constrained to cease eating: here the charcoal should be taken immediately before each meal. Another patient is not troubled with the wind till half an hour or longer after food; here the charcoal should be taken soon after the meal. Five or ten grains of charcoal is generally enough, and this dose failing, it seldom happens that a larger one succeeds. Supposing charcoal to fail in cases like these just described, we have another efficient resource in the sulpho-carbolates, or carbolic acid, which indeed, often succeed when charcoal fails.

At other times profuse formation of wind is accompanied by acidity. Charcoal, administered as just described, will generally obviate both these symptoms; and sulpho-carbolates and carbolic acid, although less successful than when acidity is absent, will often prevent the production of both wind and acidity.

Some persons after meals are troubled with a little wind, acidity, and a sensation of weight at the pit of the stomach. Charcoal will relieve these cases; but nux vomica, in five-minim doses of the tincture, taken a few minutes before meals, is to be preferred. In the treatment of flatulence it must never be forgotten to direct the patient, as far as possible, to abstain from those kinds of food prone to fermentation. Sugar and starchy foods must be avoided or taken sparingly, and thin well-browned toast, on account of the carbonization of its surface, may be substituted for bread. The meals should be very moderate, the food well masticated, and drinking postponed till the meal is nearly finished, or still better, till an hour after its completion. Tea is very obnoxious to flatulent patients.

Most of the charcoal passes away with the fæces, though a little, it is stated, finds its way into the blood and lymphatics.

Wood is preferable to animal charcoal for internal use. It is often advantageously mixed with an equal quantity of bismuth, when flatulence is combined with acidity and pain.

CARBONIC ACID.

It is asserted that this gas applied to the eye relieves the pain and photophobia of scrofulous ophthalmia, and that injected up the vagina it eases the pain of ulceration of the os uteri and of cancer and neuralgia of the uterus. According to Sir J. Simpson, the inhalation of this gas is serviceable in chronic bronchitis, asthma, and irritable cough.

Carbonic acid gas is generally employed dissolved in water. Natural waters containing a large quantity of carbonic acid are used externally in chronic gout, chronic rheumatism, and many chronic affections. Carbonic acid is an excitant of the skin, producing tingling, redness, a sensation of warmth, and increasing the flow of the perspiration; but after a time the gas acts in some measure as an anæsthetic, lessening the sensibility of the skin, and removing or diminishing pain.

Carbonic acid water, is employed in painful and irritable conditions of the stomach. It eases pain, and checks vomiting. It is an excellent addition to milk, which will then be generally retained, though previously rejected.

Lime water and milk may be profitably substituted for milk and carbonic acid water in diarrhœa with irritability of the stomach; but in case of constipation carbonic acid water and milk is much to be preferred.

SULPHUR.

SULPHUR dusted on the skin produces no effect, but mixed with lard, or other unctuous substances, and rubbed in, it excites a slight degree of inflammation; hence sulphur ointment has been used to stimulate indolent sores to a healthier and more healing condition; but for such a purpose more efficient agents have superseded sulphur ointment, which is now almost entirely restricted to the cure of itch. The object is to destroy the insect *(acarus scabiei)* and its ova, for it is on the presence of this animal that itch depends; and a knowledge of the habits of the acarus and its ova suggests the means best calculated to effect this purpose. The female, as soon as impregnated, burrows obliquely under the skin, and day by day deposits her eggs till she dies. The male remains a wanderer on the surface, and is easily attacked and killed by the ointment. To reach and destroy a female and her eggs, it is necessary to break up the burrows where these lie concealed, and to lay them bare to the destructive action of the sulphur. The destruction of the burrows is easily effected by the liberal use of soap and water, which removes the superficial and dead cuticle, and exposes the animal and its ova.

Various methods of sulphur treatment are in use, but it is sufficient here to record only a few.

M. Hardy claims that his method will cure in four hours. He first subjects the body for half an hour to a friction of soft soap, to cleanse the skin and lay bare the burrows. Then follows a warm bath of an hour's duration, meanwhile the skin is well rubbed to complete the destruction of the burrows. Then the skin is well rubbed all over,—except the head and face, unless in the rare instances when these parts are attacked,—with an ointment composed of two parts of sulphur, one of carbonate of potash, and eight of lard.

This rather severe method not unfrequently irritates and chaps the skin, and is, therefore, inadvisable for delicate skins, especially if much eczema or inflammation is present, affections which this vigorous treatment would undoubtedly much aggravate.

It is often sufficient to treat vigorously only certain parts of the body where the rash is most apparent, and to apply the ointment to other parts in a milder manner.

If the skin is delicate, much irritated, or inflamed, a mild soap may be substituted for soft soap, and an ointment without alkali and with less sulphur, while the time of the applications should be shortened, and instead of one continuous severe application, the several washings and inunctions should be repeated on successive nights. The ointment should be left on all night.

The simple ointment of the Pharmacopœia, little irritating to the skin, containing no potash or other alkali, is in most instances sufficient to cure itch in three days. The patient should be directed to take a nightly warm bath, and to rub the skin with soap, bland or strong, according to the condition of the skin. After wiping the body thoroughly dry, the ointment is to be well applied to the skin, by the fire-side, just before bed-time, and to be washed off on the following morning.

The irritation set up by the parasite and its eggs excites sometimes more or less eczema and impetigo. The treatment adapted to cure the itch, would certainly aggravate these accompanying eruptions. To avoid such a complication, Hebra recommends a milder ointment of a different composition; namely, chalk 4 oz., sulphur and prepared tar, each 6 oz., common soap and lard, each a pound, the various constituents in this preparation each serving a distinct purpose. The chalk helps mechanically to remove the dead cuticle and to break up the burrows; the tar serves the twofold purpose of diluting the sulphur and acting beneficially on the eczema, while the soap and lard further effect the dilution of the sulphur; and the soap, by virtue of its alkali, checks the weeping from the red, raw, eczematous eruption. This ointment, accompanied with the use of the warm bath, is employed twice a day, and cures completely in three days.

After the itch is cured, it often happens that the mildest ointments excite and increase the eczema and other eruptions produced by the scabies, hence it is inadvisable to continue the use of such unguent for many days. On withholding this treatment, the rashes produced by the scabies will frequently disappear at once. After the course the patient must put on an entire change of linen, and the soiled clothes should either be boiled in water, or heated in an oven, at a temperature above 212° Fah., in order to destroy the animals and ova that may be concealed in the linen.

Some maintain that the sulphur of the ointment plays no part in the destruction of the parasites, but that the fatty matters, by obstructing their breathing-pores, suffocate and so destroy them. This opinion seems to be erroneous, a sulphur ointment being far more effectual than an ointment of simple fat. Sulphuretted hydrogen destroys lice, and some suppose that this gas is the efficient insecticide in destroying the developed itch insect by the conversion of the sulphur.

Except in rare cases, the ointment need not be applied to the head and face, for, in this country, these parts are not often affected. The disagreeable odour of the ointment may be in part concealed by the addition of otto of roses or other fragrant substance.

To avoid the disagreeable odour and irritating effect of sulphur, many dermatologists substitute storax, which is said to be just as effectual.

The complexion of young women, in whom the menstrual flow is disordered, is sometimes spoiled by numerous small elevations or pimples, scarcely or not at all reddened, and sometimes a minute pustule on the summit of some of the elevations form, the skin at the same time losing its healthy transparency. This is a form of acne, perhaps, though unlike that commonly seen. Sometimes the eruption appears independently of menstrual disturbance, and, indeed, may almost vanish at the menstrual period, to recur when it has ceased. This eruption may last months, or even years, greatly to the patient's annoyance. It will, however, generally yield to the application twice or three times daily, of the following lotion:—Sulphur, a drachm; glycerine, an ounce; rose water, half a pint. This lotion speedily benefits the eruption even when for years it has remained uninfluenced by other treatment. Acne may be treated in the same way.

An ointment composed of two drachms of hypochlorite of sulphur and an ounce of simple ointment, or especially iodide of sulphur ointment, is very useful in the severer forms of acne (see Sulphides). They should be applied twice daily. Where acne indurata is accompanied by much acne punctata, frequent washing with plenty of soap and warm water will assist the action of these applications. In genuine prurigo, Dr. Anderson applies night and morning an ointment composed of an ounce of sulphur, six drachms of liquid tar, and four ounces of benzoated lard.

Being quite insoluble in any of the fluids of the mouth, sulphur possesses no taste; but, as it often contains a small quantity of either sulphurous acid or of a sulphide, it may partake of the flavour of these substances. It undergoes no change in the stomach, and in no way affects the mucous membrane of this organ.

In the intestines, however, the case is quite otherwise. Here, in ordinary doses, sulphur causes rumblings, slight colicky pains, followed in a short time by a softened evacuation, sometimes soon repeated. From the occurrence of colic, and the semi-solid condition of the motions, it is generally held that sulphur acts only slightly on the mucous membrane, but purges chiefly by exciting contractions of the muscular coat of the intestines. From the mildness of its operation it is ranked among the laxatives. The precipitated sulphur, being more finely divided than the sublimed, acts more surely and effectually as a purgative.

The too prolonged use of sulphur excites a catarrhal state of the mucous membrane, and impairs digestion.

Sulphur is a useful mild purgative in piles and fissure of the anus, when it is needful to maintain the motions in a soft and yielding state, so that the passage may not be irritated and pained by hard difficult stools. It is also employed in stricture of the rectum. In habitual or obstinate constipation it often succeeds after the failure of other remedies. The compound liquorice powder of the German codex, which is preferable to that of the British Pharmacopœia, or 10 gr. of sulphur mixed with confection of senna are convenient forms. Compound liquorice powder contains both sulphur and senna, and is not disagreeable. Dr. George Bird tells me that children like it and that for them it is an excellent purgative. The dose for adults is one to two teaspoonfuls stirred in a little water or milk. Apart from its softening effect on the motions, sulphur exerts a beneficial action on the rectum in prolapsus and in piles. A morning dose of five to ten grains of sulphur, mixed in a drachm of confection of senna, is a very useful laxative in piles.

What changes does sulphur undergo in the body, and in what way does this drug act as a purgative?

It has been suggested that some of the sulphur becomes dissolved in the fat it meets with in the intestines, and thus blended, is in a fit condition to act both as a purgative and to pass into the blood; but the fact that when sulphur is administered simultaneously with much fat, the quantity of sulphur in the urine is not increased, renders this explanation improbable.

Some of the sulphur, undoubtedly, is converted into a sulphide by the action of the alkali of the bile; for after the ingestion of sulphur, the gas generated in the intestines contains not only a considerable quantity of sulphuretted hydrogen, but much of the gas is given off by the skin, to the extent even of tarnishing metal articles worn about the person. Sulphur acts as a purgative through conversion into a sulphide, and by virtue of the same change it is enabled to enter the blood, a view supported by the fact that sulphides act in the same way as sulphur. Yet a portion in the form of fine particles, probably passes through the walls of the intestines undissolved, though the quantity so conveyed is undoubtedly very small.

The action of sulphur on the physical or chemical constitution of the blood is at present unknown. It has been said to produce salivation, occasionally, in persons who had previously taken mercury. It is generally held that it excites an increased secretion from the mucous membrane of the air-passages of healthy persons, although this is denied by Buchheim. Graves, and other authorities, strongly recommended sulphur in doses of from five to ten grains, repeated three or four times a day, in severe chronic bronchitis, with abundant discharge, especially when accompanied by constitutional debility. It is said to lessen the secretion, and to render its expulsion easier.

It is said to increase both the frequency and force of the heart's contractions, and to promote the flow of perspiration; but these assertions greatly need confirmation.

It is believed that the application of sulphur to the skin will relieve the pain of chronic rheumatism and sciatica; but, as in applying the sulphur it is generally recommended to envelope the affected limbs in soft flannel, it is difficult to discriminate to what extent relief is attributable to the flannel.

It is said that the internal administration of sulphur is serviceable in chronic eruptions of the skin of the dartrous family, as acne, psoriasis, impetigo, and eczema.

Most of the sulphur taken into the stomach escapes with the fæces; while part of that which enters the blood, becoming oxidised, appears in the urine as a sulphate or one of the lower oxides of sulphur. The sulphuretted hydrogen, from its great volatility, escapes in some measure by the lungs and skin, and occasionally with the milk, and by the urine.

It is said that a portion of the ingested sulphur passes through the system, and is separated by the kidneys in the uncombined state. Sulphur produces no change in the quantity of the constituents of the urine, with the exception of the sulphur compounds, which it augments.

Sulphur may be conveniently administered in milk.

THE SULPHIDE OF POTASSIUM, SODIUM, AMMONIUM, AND CALCIUM.

MANY natural waters contain one or more of these substances. Sulphurous waters are found at Harrogate, Barèges, etc. They have a characteristic odour like that of rotten eggs.

The three first substances are freely soluble, the last is very scantily soluble in water.

Strong solutions of these soluble salts excite active inflammation of the skin; weak solutions stimulate the skin, augment its supply of blood, and increase perspiration.

Baths containing these substances are very useful in the chronic forms of some skin diseases, as psoriasis, eczema, and lichen; likewise in chronic rheumatism, chronic gout, and chronic lead poisoning. In these diseases the natural sulphurous waters are largely used as baths; but in eczema and psoriasis care must be taken not to employ them till the subsidence of the acute stage, otherwise they will greatly aggravate the rash.

Obstinate forms of these skin diseases, rebellious to other treatment, often yield to sulphide baths.

It has been attempted to explain the efficacy of sulphurous baths, in cases of chronic lead poisoning, by the assumption that they eliminate the lead with the sweat. Under the use of these baths, the skin, it is said, becomes covered with innumerable black points of sulphide of lead; but in fact the lead thus blackened has been deposited on the skin from external sources, not eliminated with the perspiration. This objection, however, is met by the assertion that if a lead-poisoned patient carefully abstains from all contact with lead, yet, as often as he uses a sulphurous bath, his body still becomes blackened time after time. On theoretical grounds it is hard to understand how this metal can be eliminated with the perspiration; but for the further consideration of this point we must refer our readers to the section on lead.

The use of these baths at a very high temperature will often restore a considerable degree of suppleness to joints distorted and stiffened by chronic rheumatoid arthritis. Yet as other baths of like temperature appear to do equal good, it is difficult to say whether the sulphides play any part in the beneficial results, although it is true there is a wide-spread and perhaps well-grounded belief in their efficacy.

A very efficient application to cure itch is made in the following way:—Boil one part of quicklime with two of sublime sulphur in ten parts of water, until the sulphur and lime combine; let the solution stand, and afterwards decant the clear part. Metal vessels should not be used in its preparation. After the patient has bathed and wiped himself dry the liquid solution is to be painted over the body. This application is rather irritating, and sometimes produces a roughness of the skin, which may continue some time. Dr. Bourguignon, who introduced this plan, claims that it will cure in half an hour. (See *Sulphur*).

The sulphides are in part decomposed by the acids they encounter in the stomach, giving rise to disagreeable eructations of sulphuretted hydrogen gas.

The sulphides in small doses excite a sensation of warmth at the epigastrium, but in excessive doses they produce active inflammation in the digestive canal, with the customary symptoms.

Small doses act as a slight irritant to the intestines, and determine gentle relaxation of the bowels. It is supposed that sulphur acts as a purgative, by its conversion into a sulphide through the agency of the alkali of the bile.

In cases of poisoning by certain metallic salts, the sulphides are employed, as they precipitate the metal in the form of an insoluble sulphide, and so render it harmless. There is danger, however, of giving the sulphide in too large a quantity, since in its turn it might itself excite inflammation of the stomach; wherefore sulphide of iron is generally preferable to the alkaline sulphides.

The effect of the sulphides on the blood after absorption into that fluid is at present unascertained.

Persons habitually breathing air impregnated with sulphuretted hydrogen are certainly prone to suffer from great anæmia, and the gas appears to cause much functional depression.

Taken in over-doses the sulphides produce insensibility and speedy death. It has been doubted, however, whether this result is not due to the action of these substances on the stomach itself, and not to their absorption into the blood and conveyance to the nervous centres ; for it appears from Bernard's experiments, that sulphuretted hydrogen injected into a vein is so quickly eliminated by the lungs that the arterial blood is uncontaminated by this gas, and consequently the nervous centres cannot be affected by it.

These substances, in certain troublesome diseases, often yield striking results.

This group of remedies influences the suppurative process in a marked and manifest manner.

Thus the common case of a sore, discharging a thin, watery, unhealthy ichor, will speedily undergo a healthy change under the administration of sulphides of calcium, the discharge becoming at first more abundant, afterwards diminishing, and throughout continuing thicker and healthier, with all the characters indeed of "laudable" pus.

The sulphides appear to me to possess the property of preventing and arresting suppuration. Thus in inflammation threatening to end in suppuration they reduce the inflammation, and avert the formation of pus. This effect, for instance, is manifested by the action of the local application of sulphur compounds in acne indurata, a subject to be dealt with further on, more in detail.

After the formation of pus the influence of this group on the suppuration process is still more conspicuous; then the sulphides hasten maturation considerably, whilst at the same time they diminish and circumscribe the inflammation, promote the passage of the pus to the surface and the evacuation of the abscess. Their efficacy may be frequently demonstrated in cases of the following kind. An unhealthy child, from six to twelve months old, perhaps in the course of measles or scarlatina is the subject of a slight sore-throat, which produces behind the angle of the jaw considerable enlargement of the glands, and the swelling, of stony-hardness, may be large enough to interfere with swallowing and even to push the head on one side. Very deep-seated suppuration takes place, and for a long time there is neither redness of the skin nor fluctuation, and the pus very slowly makes its way to the surface, so that a fortnight, three weeks, or even a month may elapse before the abscess bursts, or is fit to be opened, when a deep hole is left, with considerable indurations around it. So great are the pain and constitutional disturbance that the child sometimes dies; and even if this fatality be averted, the deep discharging hole heals very slowly owing to the indurated and unhealthy state of the adjacent tissues. Now, in such a testing case if we give a tenth of a grain of sulphide of calcium, mixed with a grain of sugar of milk, every hour or two, the results are most striking. The pain and constitutional disturbance begin to diminish, the swelling becomes smaller, the pus reaches the surface in four or five days, leaving when it is evacuated a benign wound which quickly heals. The effects of these remedies are equally conspicuous in mammary abscesses, although in rare instances they appear temporarily to increase the pain—a fact which seems sometimes to hold good with respect to boils, though as a rule the pain is speedily mitigated. Singular to say, I have found these remedies much less useful in forwarding the maturation and expulsion of pus in indolent buboes; but in such cases my experience of the sulphides has been but small.

It may be urged that it is difficult to imagine how these remedies can produce effects so different and apparently opposite as the dispersion of inflammation in one case and the expulsion of pus in another; poultices, however, and hot fomentations both subdue inflammation and prevent suppuration, and in other cases considerably hasten the evacuation of pus.

In boils and carbuncles these remedies yield excellent results. A tenth of a grain of sulphide of calcium, given hourly or every two or three hours, will generally prevent the formation of fresh boils, while it lessens the inflammation and reduces the area of existing boils, and quickly liquefies the core, so that it separates much more speedily, thus considerably curtailing the course of the boil. Where the skin is not yet broken, and the slow-separating core therefore not yet exposed, the sulphides often convert the boil into an abscess, so that on bursting, pus is freely discharged and the wound at once heals; or if the centre of the hardened swollen tissues is not yet dead, the pustule dries up, the inflammation subsides, and a hard knot is left which disappears in a few days without the formation of a core and without any discharge. These remedies meanwhile improve the general health, removing that debility and malaise ordinarily so markedly associated with boils and carbuncles. In some cases, however, as in the deep-seated boils and abscesses of diabetes, they are less efficacious. In carbuncles the sulphides will generally be found equally serviceable, melting, as it were, the core into healthy pus, and so quickly expelling the dead and otherwise slow-separating tissue. Belladonna applied over abscesses and carbuncles reduces inflammation and allays pain. The skin should be thickly smeared with equal parts of belladonna and glycerine, and over this a poultice should be applied and the smearing renewed each time the poultice is changed. Poultices however, being liable to bring out a fresh crop of boils, it is well to smear belladonna ointment some distance round but not over the boil, and then to apply a poultice, the greasy application thus protecting the neighbouring tissues. Or, still better, apply a belladonna or opium plaster on leather, with a hole the size of the boil, around the swelling, and through the opening smear glycerine and belladonna, covering all with a small poultice. The leather plaster efficiently protects the surrounding skin and averts the production of fresh boils. I have thought it worth while to point out these useful accessory plans of protecting the boil; but it is scarcely necessary to observe that whilst investigating the effects of sulphides I have employed them alone, or at most sometimes using only a poultice. Indeed, the effect of sulphides on boils is so excellent and prompt that external applications are generally unnecessary, though of course they are required in the treatment of carbuncles.

The good effects of sulphides are conspicuous in certain scrofulous sores not uncommonly seen in children. Scrofulous children during the few first months are sometimes subject to indolent abscesses in the cellular tissue which run a very slow course. At first only small hard substances are observable, no larger than a pea, under the skin, which is of natural colour, and moveable over them. The small substances next suppurate and gradually enlarge, the skin becomes adherent, and changes in colour to red or even violet, while the smaller vessels in their neighbourhood sometimes become enlarged and even varicose. The tumours may attain the sizes of a florin, and when maturated feel soft and boggy. After a time a small circular opening appears, not larger perhaps than a pin's head, through which escapes a thin unhealthy pus. If deep-seated, as on the buttocks, or occurring in fat children, there may be very little or no discoloration of the skin. The chief noticeable character, then, is the small sharply-cut opening, as if a piece had been punched out. These formations follow one another, and may continue to distress the child for months or years. In mild cases a few only may form, whilst in severe cases there may be at one time ten or a dozen in different stages of development. When they heal they leave a white, sharply defined, but not deeply depressed scar. Now this troublesome and pertinacious condition will give way speedily to the administration every hour or two of a tenth or twentieth of a grain of sulphide of calcium. The formation of new nodules is at once checked, for a fresh one rarely now makes its appearance, although for months or years the child may have been infested with successive crops; many of the abscesses, especially in a very early stage of development, dry up and disperse, others generally speedily maturate and discharge their contents, the thin and unhealthy pus becoming creamy and "laudable"; the abscesses already in an open state improve, the pus becoming healthier, and the wounds healing quickly.

In some cases, in addition to these subcutaneous formations, the bones likewise become affected. The phalangeal bones of the hand are most frequently attacked, though not uncommonly the metacarpal, and more rarely the metatarsal. Where the phalangeal bones are affected, one or several of the fingers become nodose. For a long while the skin remains pale and freely movable, but then suppuration ensues, the swelling increases, the skin becomes red and painful, and, after a time slowly softens at one point, remaining boggy for a considerable period before the abscess opens naturally. Then generally a little bone separates, or in bad cases the whole of the shaft comes away, leaving the epiphyses behind. When an opportunity occurs to examine these bones before suppuration sets in, the shaft is found considerably enlarged, very pale, and the cancellous structure infiltrated with a straw-coloured firm substance, whilst the epiphyses and their cartilages are healthy. Even in these severe cases the sulphides will benefit considerably; thus before suppuration has set in, or whilst it has made little way, they often remove the swelling, though large doses may be required. After much suppuration, the good effects of sulphides depend in a great measure on the amount of the disease of the bone. If the whole shaft becomes necrosed, of course the sore will not heal till the bone has been got rid of; but suppuration often occurs and yet but little, or perhaps none of the bone dies. In such a case the sulphides hasten the expulsion of the pus; and when the skin is already broken, they improve the character of the wound and the discharge, and heal the sore, leaving a sunken scar adherent to the bone, whilst the finger slowly assumes its natural proportions. The sulphides similarly affect large indolent abscesses on the back of the hands or on the feet. Whilst thus influencing locally strumous formations and abscesses these remedies improve the child's health, which perhaps had failed before in spite of cod-liver oil and steel wine. That the improvement is due to the sulphide is shown by the fact that the amendment occurs when this drug only is administered. On prematurely discontinuing the sulphide, fresh formations are apt to appear, especially on the occurrence even of a slight illness; indeed a severe illness will often excite a few fresh abscesses, in spite of the sulphides.

In suppurating scrofulous glands in the neck, the sulphides appear to me to exercise a very beneficial influence by hastening the elimination of the pus, and subsequently the cheesy scrofulous matter. After the abscesses have burst, and continue to slowly discharge a scanty, unhealthy pus, and when the edges of the sores have become much thickened and indurated, the sulphides render the discharge more abundant, thick, creamy, and healthy, considerably hasten the evacuation of the scrofulous matter which prevents the healing of the wound, and at the same time soften the round indurated edges, so that the sore heals much more speedily. If small doses appear to affect these sores inadequately, larger doses, as half a grain or a grain, should be given several times a day, or even every two hours. I need hardly say that to compass the results described the treatment must be continued several weeks, for when the sores have been discharging perhaps for months or even years, it is vain to expect much amendment in a few days.

The topical effect of sulphur ointment, or of an ointment of the hypochlorite of sulphur, or, still better, of the iodide of sulphur of the Pharmacopœia, is very marked on acne indurata and acne rosacea. Here, again, according to the stage of the eruption, the effects are twofold, and even opposed. If applied at the very commencement of the eruption as soon as the little hard knot is felt under the skin, the ointment arrests further development and quickly dissipates the hardness. For instance, if smeared over the hardness just before going to bed, scarcely any induration will be felt in the morning, though after a time, perhaps from exercise, or the irritation from washing, much of the hardness may return, to be again removed by a renewed application of the ointment, so that in two, or at most three days, it will completely disperse a papula which threatened to become of considerable size. When, however, the nodule has advanced further, and suppuration has set in, then the effect of the ointment is much like that of sulphides, administered internally, on boils. The ointment hastens maturation, limits the swelling and hardness, and thus considerably curtails the duration of the eruption. Nay, further, if rubbed over the skin it appears to check the formation of the acne spots; rubbed over the nose and neighbouring parts of the face in acne rosacea its effects are often striking. Not only does it act as in acne indurata, but the hardened, swollen tissues become softened and reduced to a more natural state. I have found the iodide of sulphur useful likewise in bromic acne; it reduces the eruption, or, at least, lessens considerably the size of each spot. The ointment should be thickly smeared over the eruption of acne night and morning.

A formula adopted by the author is a mixture of much the same strength as the Harrogate waters. Thus I mix a grain of the sulphide of calcium (the member of this group which I always employ) with half a pint of water, and give to a child a teaspoonful hourly. It is essential that the medicine in this form should be compounded daily, since the salt rapidly becomes oxidized and changed into a sulphate, so that in a very short time none of the sulphide remains. It is still more convenient to give the sulphide in powder; dose for an adult from one-tenth to one-half of a grain mixed with a grain or two of sugar of milk, taken hourly, or every second or third hour as the case may require. Four to six powders daily are usually sufficient; a child should take one-tenth or one-twentieth of a grain, and the powder should be put upon the tongue and washed down with a draught of water, or a tenth of a grain made into a small varnished pill, should be taken hourly.

It should be observed that, in employing these agents in baths, porcelain or wooden vessels must be used, as the sulphides attack and discolour most metals. These baths emit a powerful odour, very offensive to some people.

CHLORINE GAS.
CHLORINE WATER.
CHLORINATED SODA } and their solutions.
CHLORINATED LIME }

These substances are used as deodorizers, disinfectants, and antiseptics.

Whatever power they possess in these respects is due either to chlorine or to hypochlorous acid.

Chlorine gas, possessing very strong chemical affinities, acts probably by seizing with avidity upon the hydrogen in organic and inorganic substances, thus breaking up their composition.

Hypochlorous acid, which is given off abundantly by the two last-mentioned members of this group, is an active oxidizing agent. It yields up its oxygen readily, and is thus destructive to many substances: at the same time chlorine gas is set free, which in its turn acts in the way just described.

These substances are therefore deodorizers, destroying the ammonias, sulphuretted hydrogen, and sulphides of ammonium, which create the disagreeable odours of sick rooms.

Owing to its gaseous state, chlorine is admirably suited as a deodorizer; it penetrates every cranny of the room, searching out and destroying noxious and offensive gases.

While these substances may be conveniently and profitably used as deodorizers, it must always be borne in mind that it is better to prevent bad smells by free ventilation, and that chlorine gas itself has an odour very disagreeable to most people. If these deodorizers are often required in a sick room, it is a sure sign that ventilation is defective, and probably that the nurse is careless.

These substances are employed as disinfectants, but the evidence in favour of their possessing such a property, although very generally held to be sufficient, is inconclusive.

Some infecting matters, it is true, when treated with these substances, lose their power to propagate disease; but it is impossible to subject objects, and particularly persons, to such destructive action as is found to be required in these experiments. It is, however, not the less desirable to fumigate rooms lately occupied by the sick; the process does no harm, and is probably highly salutary.

To disinfect unoccupied rooms, the air must be very strongly impregnated with chlorine. M. Regnault recommends the following plan, first blocking the chimney and closing the room:—sew one pound of chloride of lime loosely in a strong canvas bag, and put it into a mixture composed of a pint and a half of commercial hydrochloric acid with four and a half pints of water. Then after twenty-four hours, free ventilate the room for forty-eight hours.

Besides their capacity to destroy many offensive gases, these substances prevent decomposition; hence they are useful as washes or injections to prevent the decomposition of the pus of sores or cavities of the body. Sloughing, foul-smelling sores, should be washed with solutions of these or other kindred subtances. Chlorine compounds, being slightly stimulating, improve the condition of indolent sores. After an operation, the pus which sometimes collects in the hollows left becomes corrupt, and gives off fœtid gas which becomes absorbed and poisons the system. This may be avoided by washing out the cavities several times daily with a weak chlorine solution. In puerperal peritonitis, or at any time when the uterus contains decomposing matter, the vagina must be thoroughly and frequently washed out, some deodorizing and antiseptic substance being mixed with water. Many obstetricians in puerperal fever and other conditions wash out in this way the cavity of the womb itself.

In empyæma, after the chest is opened spontaneously or artificially, the putrefaction of the contained pus must be prevented by washing out the cavity with antiseptic substances. A solution of quinine eight to ten grains to the ounce is very useful for this purpose. Antiseptic solutions in sloughing of the throat, as in scarlet fever or diphtheria, and in salivation and ulceration of the mouth, will remove the foul odour and tend to arrest putrefaction.

A strong solution of chlorinated soda has been highly recommended in diphtheria.

The deodorizing and antiseptic substances chiefly in use, besides the members of this group, are iodine, permanganate of potash, and carbolic acid. Solutions of permanganate of potash, unless unnecessarily strong, are bland and unirritating; while the chlorine and carbolic acid solutions are stimulating, and even irritating. Carbolic acid in some respects is inferior to the other members of this group, since it seems to lack power to destroy offensive gases.

IODINE.

Iodine possesses powerful chemical affinities, and combines energetically with many organic and inorganic substances. It is volatile, and readily penetrates the animal textures.

It is applied to the skin for a variety of purposes. A strong solution, as the liniment, is frequently used as a rubefacient and counter-irritant, producing at first a sensation of heat and burning, which may increase to an unendurable extent. The inflammation it excites separates the cuticle to a greater or less extent from the dermis, so slight it may be that in a few days mere desquamation results; but if the liniment is strong it rapidly produces even a blister containing serum with much fibrin, leaving sometimes a permanent scar—a misadventure which should be carefully avoided.

The skin can generally bear two lightly painted coats of the pharmacopœia liniment, unless a previous application has rendered the skin thin and delicate, when one coat lightly applied, is all that can be endured. If, as sometimes happens, the application causes much pain, the iodine should be washed off with spirits of wine, gin, whiskey, or eau de Cologne, or, best of all, with a solution of iodide of potassium, and the pain subduced by the application of a poultice. On and around the painted spot iodine liniment will often excite a crop of itching papules which often appear as late as the third or fourth day after the application.

The liniment applied to the chest as a counter-irritant in chronic pleurisy is used to promote the absorption of the fluid accumulated in the pleura. Painted under the clavicles in the chronic forms of phthisis, it is of great service to allay harassing cough, and to check secretion from the bronchial tubes and cavities of the lungs. Painted over the front and back of the chest it often affords relief in chronic bronchial catarrh by easing the cough and lessening expectoration. It may also be painted on any part of the chest affected with pleurodynic pains, although a mustard poultice is preferable, as it can be re-applied should the pain return. The iodine, however, may succeed where the mustard fails. Iodine is painted around joints affected with chronic rheumatism or chronic gout, or with chronic synovitis. Like blisters it eases the pain, and often removes the fluid distending the cavity of the joint; like blisters, too, it often causes, for a few days, increased distension of the joint, the good effects not becoming apparent till later. This increase in the swelling may be regarded as an indication of the success of the application. The liniment is useful when painted on the skin over a bronchocele. It should be applied,—though it can seldom be borne oftener than once a week—as often as the state of the skin will permit, till the tumour disappears. The liniment or tincture is recommended as an application to lupus, painted not only on the edges of the sore, but also over the tissues around it. It is said to arrest the spreading of the disease. In the form of ointment its applications are manifold. It is of the greatest benefit in chilblains, if well rubbed over the affected part before the skin is broken. The tincture lightly painted over the part is often used for chilblains, but the ointment is far more efficacious, curing unbroken chilblains in one or two days. In this harassing affection I know nothing so effective.

The ointment is often useful in removing some of the non-inflammatory pains of the chest; but these, not being always of the same nature, discrimination must be exercised. When the pain is situated in the muscles (myalgia), and these are tender on pressure, while the skin may be pinched without pain, this ointment is indicated. But if the tenderness is situated in the skin (pleurodynia), belladonna is to be preferred. I believe Dr. Hare first pointed out this distinction, and it is one which holds true, though not without exceptions.

The ointment, tincture, and liniment of iodine are used for the same purposes; but it must be recollected that the ointment and tincture are much milder preparations, and will even after several applications produce but a small amount of desquamation. When a strong irritant action is needed, the liniment must be employed; and a medium effect can be produced by suitably diluting the liniment with spirit.

The tincture or the ointment is often applied over indurated swollen glands, or parts thickened by inflammation, with the intention of removing the diseased products; but when painted over scrofulous glands, or glands sub-acutely inflamed, care must be taken, lest the applications increase the inflammation and favour suppuration. Iodine mixed with light oil of wood tar in the proportion of two drachms of iodine to an ounce of oil of wood tar, has been recommended by Mr. Coster, as an efficient application in tinea tonsurans. It usually produces no pain, and without doubt prevents the extension of this troublesome disease.

In many cases where the disease involves a large part or the whole of the head, this application may be painted over the entire scalp. Occasionally, however, the skin is so delicate that this extensive application cannot be borne, and then it should be applied only to a small surface and painted on a fresh part daily. In some cases it gives so much pain that it cannot be at all tolerated. Coster's paint, as might be expected, is far more effectual in the circumscribed than in the diffuse form.

The liniment, ointment, or tincture, will remove herpes circinnatus. One application of the liniment is enough, but the ointment or tincture must be applied once or twice daily.

It is stated that painting the affected and circumjacent skin with a solution of iodine, will prevent the spread of erysipelas.

Mr. Jordan and Dr. T. K. Spender speak highly of the application of the liniment in the neighbourhood of local inflammation; applied so as to produce vesication around a bubo, an abscess, or a carbuncle, it considerably reduces inflammation.

In hydrocele, iodine in solution, generally the tincture, is perhaps the best fluid to inject into the serous cavity surrounding the testicle. The serous fluid is first drawn off, then the iodine is injected into the cavity, which, exciting adhesive inflammation, the contiguous surface of the sac unite and the further effusion of serum is rendered impossible.

Iodine solution is injected into joints affected with white swelling, into the cavity of the pleura in empyema, into ovarian tumours after tapping, and into large abscesses, after their evacuation. Ten ounces of the tincture, and even more may be injected into an ovarian sac. The results of the cases thus treated are most satisfactory. The injection of white swellings is said to produce no ill symptoms, and unless there is caries or necrosis of the bones, or swelling of the surrounding parts, this treatment is generally favourable.

In chronic pleurisy, after the side has been evacuated, iodine injections remove the great fœtor, often present from the decomposition of pus in the pleural sac, and at the same time diminish the secretion from its walls. The injection must at first be weak, say four or five grains of iodine and iodide of potassium to a pint of water, but when the structures have become accustomed to it a stronger solution may be employed. No doubt this treatment is often successful, still it must be carried out with the greatest caution, otherwise inflammation, with high fever, may set in, and prove fatal.

Milder injections containing permanganate of potash, or a small quantity of creosote, or quinia are generally adequate to destroy the fœtor, in which case the more powerful agents are of course not to be used. Since the wasting, the loss of appetite, and depression in cases like these is mainly traceable to the absorption of poisonous gases and putrid fluids, it is of the highest importance to keep the sac free from them.

Iodine solutions injected into the cavities of large abscesses, their contents having been discharged, often prove very serviceable. The tincture itself may be freely used; the cavity of the abscess should subsequently be kept clean and sweet by frequent washings with a weak solution of permanganate of potash. Iliac and lumbar abscess may be treated in this way.

The tincture of iodine may often be used as an inhalation, with signal benefit in the four following instances.

1. In the chronic forms of phthisis (fibroid lung), when the expectoration is abundant, and the cough troublesome. An in-

halation used night and morning will generally lessen the expectoration, and allay the cough.

2. Children, six to ten years of age, after measles, or independently of it, on exposure to cold, are seized with hoarseness, a hoarse hollow cough, and some wheezing at the chest. This affection involving the larynx, trachea, and larger bronchial tubes often proves very obstinate, is apt to return, and to persist a considerable time.

3. In some epidemics of diphtheria, Dr. Waring-Curran recommends the following mixture:—4 grains of iodine, 4 grains of iodide of potassium, 4 drachms of alcohol, and 4 ounces of water. A teaspoonful of this should be added to boiling water kept hot by a spiritlamp and the steam inhaled. As the patient becomes accustomed to the iodine, the quantity of the solution may be increased till half an ounce of it is used at each inhalation. It should be repeated many times a day, and each inhalation continued from eight to twelve minutes.

4. In itching of the nose or of the inner canthus of one or both eyes, sneezing, running at the nose of a watery fluid, weeping of the eyes, and severe frontal headache. Patients of various ages are greatly troubled, often for many years, with daily attacks, lasting, it may be several hours. Iodine inhalation often removes this affection at once, and when it succeeds only partially, it almost always lessens the headache and the discharge from the nose. Its effect is most marked on the itching. (See Arsenic).

I generally adopt the following simple, handy, cleanly and effectual plan of inhalation:—Heat well a jug capable of holding about two pints, by rinsing with boiling water; then partially fill with boiling water, into which pour twenty or thirty drops of the tincture of iodine; then direct the patient to put his face over the mouth of the jug, and to breathe the iodized steam; covering both the jug and the patient's head with a towel to prevent the escape of the steam. This inhalation should be used night and morning, for five minutes, or a little longer. Occasionally an excess of iodine will temporarily produce a sensation of soreness in the chest and throat, sometimes with redness of the conjunctiva, running from the nose, and pain in the head.

Iodine inhalation is sometimes employed in chronic bronchitis; but without much advantage.

The tincture is useful to remove tartar from the teeth; and to stimulate the gums when they begin to recede, leaving the teeth exposed and more liable to decay. It should be painted over the gums close to the teeth.

An iodine gargle, made with two or four drachms of the tincture to eight ounces of water, has been recommended to allay mercurial salivation; and the tincture of iodine is applied to sores of the throat, syphilitic and simple.

Iodine in undue quantity, irritates and excites inflammation in the delicate structures of the stomach, inducing pain at the epigastrium, vomiting, diarrhœa, sometimes much collapse, and even death. It should be given soon after a meal, when the mucous membrane is protected by the food.

When iodine reaches the stomach or intestines, and certainly when it enters the blood, theory would suggest that this drug becomes converted either into an iodide of potassium, or, more probably, of sodium, and thenceforth, in its career through the body, it would behave as an iodide. Practically there is much to confirm this view, as the action of iodine on the distant organs of the body is very generally admitted to be identical with that of the iodides; yet some practical authorities state, that in chronic rheumatic arthritis the tincture of iodine is serviceable when the iodide of potassium fails, although it is difficult to understand how this should be.

Iodine may be used as a deodorizer and disinfectant by simply suspending a chip-box or saucer containing a few grains over the patient's head.

IODIDE OF POTASSIUM.

This being an extremely soluble salt, endowed with a very high diffusion-power, finds ready entrance into the blood, and speedy exit from it with the secretions of the body.

As an external application, it formerly enjoyed more favour than is accorded to it now. As an ointment to the skin over enlarged glands, or parts thickened with inflammatory products in conjunction with the internal use of iodide of potassium, it hastens the resolution of obstinate nodes, and is especially useful when the internal use of this salt disagrees, causing nausea, diarrhœa, or great prostration. The ointment is sometimes used for the itch; and the ointment of this salt, or of iodine, is often used in bronchocele.

According to most authorities, the iodide, probably after its absorption into the blood, produces decided changes in the mucous membrane of the mouth, causing redness and injection of the lining of the cheek, the throat, soft palate, and of the tongue, and an increased growth and separation of the epithelium covering these parts, and an augmented flow of saliva. These phenomena, however, are certainly often absent after large doses of the medicine, and even in severe iodism.

A large dose irritates the stomach, and disorders digestion. Some are far more prone than others to be thus affected; so prone that even minute medicinal doses sometimes irritate the stomach.

Like the chloride of sodium and chloride of ammonium, this salt increases the production of mucus from the stomach and intestines, as well as from the mucous membrane of other parts of the body; but when such a result is desired, we resort to the chloride of ammonium in preference to this salt.

Its great diffusion-power enables it to pass with great rapidity from the stomach into the blood, and it very speedily appears in the urine, so that only a small proportion passes into the intestines. It purges only when taken in very large doses, but it is never employed for this purpose.

Some maintain that when iodide of potassium comes in contact with choride of sodium, either in the stomach or blood, it changes its base, becoming iodide of sodium. At present we know but little what physical or chemical changes it produces in the blood, or in the organs to which it is carried.

If its administration is continued for a long period, or if the patient manifests great susceptibility to its action, we produce a condition termed iodism.

Many persons can take this drug in very large quantities for an almost indefinite time without the induction of iodism, while very small doses even of a grain or part of a grain cause others to suffer.

The tissues most frequently and most severely influenced by this drug are the mucous covering of the eyes and lining of the nose, frontal sinus, and mouth, with the skin of the face. Some slight running at the nose is first noticed, with occasional sneezing, and a little frontal headache; these symptoms becoming more marked when the conjunctiva is injected, and the tears flow abundantly. The loose tissues about the orbit become swollen, reddened, and œdematous, and occasionally a peculiar rash appears on the skin of the face, at first noticed around the eyes, after which it attacks the nose and its neighbouring parts, and then the chin. The parts in the order here stated are severally most severely affected. The nose is sometimes reddened, especially at the tip, and is rather swollen. The rash does not always present the same appearance. It is often very much like acne, and is always hard, shotty, and indurated, but the papules may be broad and large, and covered with what looks like a half-developed vesicle or pustule. The changes in the mouth have already been mentioned, when speaking of the influence of this medicine on that part. With some persons the stomach is at the same time deranged, although in the author's experience this organ often escapes when the face is affected; on the other hand, the stomach sometimes suffers when the nose and eyes are unaffected. When the stomach is singled out by the iodide, it induces nausea, and a sensation of sinking at the epigastrium, with loss of appetite, and sometimes watery diarrhœa. A grain or even less may thus affect the stomach.

If the drug is discontinued on the occurrence of iodism, the symptoms just described speedily disappear; and the rash on the face, the running at the eyes, &c., will greatly decline in the course of twenty-four to forty-eight hours.

Iodides sometimes, as I shall show presently, cause diuresis. In some persons iodides produce a petechial rash, affecting almost always the leg exclusively, rarely extending above the knee, and rarer still to the trunk or upper extremities. It may, at first, take several days to produce this rash, but when the spots have disappeared, a single dose of five grains may, in three hours, suffice to reproduce it. Sometimes on persisting with the medicine no fresh rash appears, and the old spots die away; while in other cases the rash endures as long as the medicine is continued. This rash may be the only apparent effect of the iodide, but it is generally accompanied in a variable degree by a few or many of the symptoms of iodism. The salts of iodine differ with respect to the production of this rash; thus in many cases the ammonium salt is most apt to induce it, and the sodium salt the least liable; in other cases where the ammonium and potassium salts produce a large crop of petechiæ, the sodium salt is inoperative. Some persons are equally affected by each of these three preparations. In one case while the ammonium and potassium salts produced numerous petechiæ, the sodium salt failed to do so, but excited on the arms some erythema marginatum. The petechial rash is often preceded by a sensation of heat accompanied by some tenderness. These facts seem to disprove the assertion that either in the intestines or blood all iodides ultimately become iodide of sodium.

Iodide of potassium sometimes produces distressing depression of mind and body, rendering the patient irritable, dejected, listless, wretched, and unable to take moderate exercise without fatigue and perhaps with a tendency to fainting. The appetite is generally very bad. These symptoms may arise from a very small dose, and may occur without coryza or irritation of the stomach—a fact important to bear in mind, otherwise, the cause of the depression being overlooked, the medicine may be persisted in. On discontinuing the drug, these distressing symptoms disappear in one or two days. It now and then exceptionally happens that the symptoms just described sometimes cease in a few days even though the patient goes on taking the medicine.

When the potassium salt is not tolerated, the ammonium or sodium salt can sometimes be borne. Thus iodide of potassium in ten grain doses thrice daily, produced so much headache, sneezing, and running at the nose, that it could not be continued, whilst the same dose of iodide of sodium was easily borne, causing no headache, and only a little running at the nose.

A full dose of carbonate of ammonia or spirits of ammonia given with the iodide of potassium will, it is said, obviate these symptoms of iodism; but though I have many times put this recommendation to the test, I have seen no decided results, although perhaps the ammonia did occasionally somewhat control the iodism.

Ten grains of iodide of potassium taken at bedtime often cuts short an acute cold in the head, especially at the onset. It is much less efficacious if the cold attacks the lungs also and in influenza it appears to be useless. In ten-grain doses several times a day it is said to cure that troublesome and obstinate affection, violent paroxysmal sneezing (see arsenic). It is likewise useful in chronic colds in the head.

The iodide is employed in a great variety of diseases. It is largely employed in syphilis, but is not equally efficacious in all its forms, being more useful in secondary and tertiary syphilis, especially in the tertiary form, where mercury may do harm. The iodide should be employed when the health is broken, when mercury has been taken without good results, or when the bones are diseased. It is conspicuously beneficial, when the disease fixes on the periosteum of the bones or fibrous structure of the softer organs, and forms what are called nodes. Its action on this form of the disease is almost magical; it soon subdues the pain, and the nodes, if not of long standing, quickly disappear. In the treatment of tubercular syphilitic skin eruptions, Dr. Neligan prefers it to a salt of mercury. The iodide of potassium is of very great service in syphilis of deep-seated and important organs. It has been commended in syphilitic iritis; but in this case most authorities prefer mercury. The secondary syphilis of children is best treated with mercury; yet the following somewhat rare form of syphilis gives way best to iodine.—In children, a few months or years old, a syphilitic thickening of the periosteum is sometimes observed, usually attacking the heads of several of the long bones, but sometimes also the shafts. The thickening is first felt around the bones; but as the disease advances the neighbouring soft tissues become infiltrated with a firm exudation, which may increase to such a degree that the implicated part of the limb becomes much swollen, the skin very tense and shining, and a little reddened. The affected parts are very painful. When the disease is seated at the head of the bones, the movement of the joint is not impaired. If long uncured, this condition leaves behind it permanent thickening and enlargement; and so we sometimes see children with syphilitic teeth, and blind from syphilitic iritis, with considerable enlargement of the heads of several of the long bones.

Certain non-syphilitic periosteal thickenings yield likewise to this remedy.

The iodide of potassium has been recommended in mercurial salivation. I agree with those observers who believe that iodide of potassium often aggravates mercurial salivation; and yet the iodide sometimes appears to be undoubtedly beneficial.

As the action of the iodide on the mercury in the system throws much light on this question, we will now shortly discuss it. The mercury salts, like those of most other metals, form insoluble compounds with albuminous substances. These compounds are very generally soluble in the chlorides, bromides, and iodides of the alkalies, but especially in the iodides. Many metals, amongst others mercury and lead, are deposited from the blood in an insoluble form in the animal structures, and iodide of potassium, by re-dissolving either of these two metals, brings one or the other again into the circulation, and so re-subjects the system to its influence. But then iodide of potassium will promote the separation of both mercury and lead by the urine, and thus help to free the system from their pernicious effects.

It has been said that iodide of potassium will dissolve mercury compounds of albumen in the body, and bring them back into the circulation; and herein we have the explanation of a well-known property of this salt, namely, that of producing salivation in persons who had previously taken a considerable quantity of mercury. After taking mercury for some time, if a patient had then become salivated, it would naturally be anticipated that iodide of potassium would still further increase the ptyalism, and not check it. In other cases it might happen otherwise; for we have seen that the salt will effect the separation of this metal through the urine. In a case, therefore, where but little mercury has been taken, during only a short time, yet sufficient to produce salivation, the iodide of potassium, by quickly separating the metal from the system, would remove the mercurial symptoms, including the salivation. Should it ultimately prove that the increased elimination is due to the mercury being brought back into the circulation, and so under the influence of the kidneys, and that the iodide does not promote the exit of the metal in any other way, then the iodide must be simply harmful in mercurial salivation.

It has been said that this salt of itself will produce salivation, an effect which has been ascribed to the action of the iodide on the mercury in the way just explained; others hold, even where no mercury has been taken, that the iodide of potassium itself increases the salivary secretion to a variable amount in different persons.

The unequalled efficacy of iodide of potassium in eliminating lead from the system through the urine has led to the employment of this drug in lead poisoning. Further on, when treating of lead, it will be shown how by virtue of its power of eliminating this metal, iodide of potassium may prove useful in certain forms of gout.

It is of signal service in bronchocele, when the enlargement of the thyroid gland is due to hypertrophy, not to cystic formations, or to other causes. Its internal employment is often supplemented by painting the swelling with the tincture or liniment of iodine. Iodide of potassium is used too in either induration or enlargements of the glands, as of the mamma or testicle, though with less advantage than in bronchocele.

The iodides quicken the absorption of inflammatory effusions, such as occur in pleurisy and in inflammatory thickening of organs. Iodide of potassium sometimes relieves sciatica and lumbago, although it very often fails to affect either, especially sciatica, even when the pain is worse at night.

Iodide of potassium sometimes benefits chronic rheumatism, chronic rheumatic arthritis, chronic gout, especially the two former affections. It should, however, always be borne in mind, that the pains of secondary syphilis, frequently resembling in all respects those of so-called chronic rheumatism, are frequently confounded with, and included among, the manifold affections termed chronic rheumatism. Some of the so-called cases of rheumatism relieved by iodide of potassium are probably cases of syphilis.

The pains which yield to iodide of potassium are mainly those marked by nocturnal increase of suffering, a symptom which may be accepted as a strong indication for the employment of this medicine,—an indication holding true, whether the pains are referable to rheumatism or to some other source. Syphilitic pains, it is well known, are generally worse at night, and so are the pains of many cases of chronic rheumatism; now, the iodide generally benefits these rheumatic cases.

A patient, generally a man, complains of a pain in the head, mostly throbbing in character, sometimes accompanied with intolerance of light,—a pain which may be felt over the whole head, or beginning at the back of the neck, and thence passing over the vertex to the brow. This pain, worse, or indeed felt only, at night, becomes almost unendurable; and, in the patient's vernacular, is fit to drive him out of his mind. Alcohol is apt to intensify this pain. The pain having passed away, leaves the scalp very tender. Whether this form of headache is due to syphilis it is impossible to say, as it does not present its characteristic features. Iodide of potassium in ten-grain doses, repeated three times a day, will generally cure such a case.

Iodide of potassium is sometimes singularly useful in peptic and bronchial asthma. Five grains or more, three times a day, may be required. Now and then its good effect is not manifested for some time, though possibly in such a case, larger doses would bring prompter relief. The late Dr. Hyde Salter, whilst admitting the great efficacy of this salt in some instances, is inclined to think that in the majority of cases it is useless. My limited experience leads me to think it more frequently useful than Dr. Salter was willing to admit.

Iodide of potassium has sometimes obviated barrenness, presumably due to syphilis.

Iodide of potassium occasionally acts as a powerful diuretic in Bright's disease. I have seen it remove all the dropsy in thoroughly water-logged patients, every part of the body being œdematous, the legs swollen till they could not be bent, the skin shiny from distension, and the abdomen distended with fluid. The iodide increased the scanty urine from a few ounces daily to 30, then 50, 60, and 120 ounces till the dropsy disappeared, every vestige of it in a fortnight. While, however, this drug increased the urinary water and removed the dropsy, it produced very little effect on the amount of albumen. Of course, in proportion to the increased quantity of urine, the relative amount of albumen diminished; but, in fact, the albuminous urine is simply more diluted, and in estimating the amount of albumen separated in the day, we must bear in mind the amount of urine voided. For instance, if a patient is passing only ten ounces daily, and on boiling the urine the coagulated albumen occupies half the tube, if then the urine is increased to twenty ounces the coagulated albumen will occupy only a quarter of the tube, although the quantity of albumen separated remain the same. Where the iodide proved so useful, I at one time thought the patient had suffered from syphilis of the kidneys, and that the drug, removing this disease, the kidneys recovered their lost power and eliminated the dropsical fluid. In some of my cases, however, there was no reason to conclude that the patients were syphilitic; the disease, in some cases, following scarlet fever, in others, it appeared to be due to cold. Like other diuretics, as for instance, resin of copaiba, its action is very uncertain. In many cases, in most, indeed, the iodide fails altogether; but this uncertainty can in part be explained; thus a moderate dose of from five to ten grains will act powerfully with a certain number of patients, whilst in others the dose must be very large. In one case I did not obtain its diuretic action till I gave one hundred grains daily, and even this dose had to be increased to two hundred daily to maintain the effect and eliminate all the dropsy. Now, in most patients, large doses bring on severe iodism and depression, so that probably the diuretic dose cannot be reached.

How comes iodide of potassium to produce this great increase in the quantity of the urine and cure the dropsy? We will first consider how dropsy is produced, and then we shall be better able to appreciate the various ways this drug may act.

In health nutritive plasma escapes from the blood-vessels into the adjacent tissues, and is afterwards absorbed by the lymphatics and possibly by the blood-vessels. This transfusion and absorption counter-balance each other, and hence only a moderate amount of fluid is found in the parenchymatous tissues. But if a disturbance arises in the balance between these two processes, the parenchymatous fluid increases, producing dropsy or anasarca, a condition due either to too large a quantity of fluid transfusing through the blood-vessels or to deficient absorption. Nutritive plasma passes from the blood-vessels by filtration, diffusion, or secretive attraction of the tissues for the fluids in the blood. Dropsy never probably happens through increased attraction of the tissues for the plasma, but generally on filtration. The amount of fluid escaping from the tissues by filtration depends on the difference between the pressure of fluid in the blood-vessels and in the parenchymatous tissues. In health the pressure of the fluid in the blood-vessels is higher than that of the fluids outside the capillaries, and hence a constant current of nutritive plasma flows through the blood-vessels to the tissues outside them. An increase of the blood pressure will augment the escape of fluid and produce dropsy.

This form of dropsy occurs in any hindrance to the venous circulation, as tricuspid regurgitation, or coagulation of blood in a vein. It has been asserted that mere venous obstruction cannot cause dropsy though it may favour it, but that without some affection of the nervous system dropsy will not occur. Thus the ascending vena cava in dogs has been tied without producing dropsy of the posterior limbs, but on cutting the nerves of the sciatic plexus, dropsy came on immediately; and as the divisions of the nerves inside the spinal canal (that is before the vaso motor nerves join them) does not produce dropsy, it is concluded that paralysis of the vaso motor nerves is the cause of dropsy. Clinical facts, however, certainly prove that mere venous obstruction will cause dropsy. Cirrhosis of the liver, or a tumour pressing on the vena portæ, or coagulation in the vein as it enters the liver will produce ascites. Are we to conclude that these diseases paralyse the vaso motor nerves of the abdominal blood-vessels? Again, tricuspid regurgitation produces general anasarca (though it must be admitted, not in proportion to the amount of obstruction, judging by the lividity and the fulness of the jugular veins); is it feasible to infer that this condition paralyses the vaso motor nerves? In venous obstruction, moreover, dropsy always shows first and most markedly in the most dependent parts, where the lateral pressure on the vessels is greatest, and are we to suppose that the vaso motor paralysis attacks these parts first and then gradually ascends the lower limbs? Tricuspid dropsy is a good example of dropsy due to increased filtration, by increased lateral pressure of the blood-vessels, though diminished absorption also probably plays a part in the production of this dropsy; for the lymphatic vessels empty themselves into the veins, and any general venous obstruction must cause lymphatic obstruction, and thus deficient absorption.

Remedies may therefore remove dropsy, (1) by diminishing pressure and lessening transfusion from the blood vessels, or (2) by increasing absorption, or by both modes combined.

Again, increased absorption is probably promoted by remedies which act at once on the kidneys, increasing the amount of urine and lessening the amount of water in the blood, and so drinking up as it were the water from the parenchymatous tissues. Now this direct increase may be produced in two ways, by "stimulating" the organ, or by removing those diseased conditions which hinder its secretion.

Digitalis is an excellent example of a remedy capable of removing dropsy by lessening transfusion from the blood vessels. By obviating tricuspid regurgitation, through its influence on the left side of the heart digitalis lessens or removes passive congestion, diminishes blood pressure, and consequently filtration, reduces the amount of transfusion from the blood-vessels, and prevents further development of the dropsy. By obviating venous obstruction, it removes lymphatic obstruction, and thus favours absorption by the lymphatics; hence the excess of parenchymatous fluid is taken up by these vessels. Moreover, if there is much dropsy, on removing the congestion, the pressure of the fluids outside the blood-vessels very probably becomes greater than that in the vessels, and hence the fluids will flow into the blood-vessels. The water in the tissues is then brought back into the circulation, and eliminated by the kidneys. But digitalis also by its indirect influence acts on the kidneys. During tricuspid regurgitation, the kidneys become congested, hampered, and inactive. Removing general congestion by its effects on the heart, digitalis relieves the kidneys, and allows them to return to their natural state, and hence they quickly eliminate the excess of water in the blood due to the absorption of the dropsical fluid. When all the water has been absorbed from the tissues into the blood, and eliminated by the kidneys, digitalis no longer causes an excessive flow of urine, as would happen if it acted directly on the kidneys.

How is iodide of potassium a diuretic?

Does it stimulate absorption of the intercellular fluid, *i.e.*, the dropsy? Or does it obviate a condition tending to augment transfusion from the vessels? Or does it act directly on the kidneys, either by stimulating them or by removing the diseased condition, hampering secretion? I suggest that where iodide of potassium acts as a powerful diuretic in Bright's disease, it does so, in part at least, by directly promoting absorption.

It may be said, that it acts simply by stimulating the kidneys. In some healthy persons it is a powerful diuretic, and not so with others, and perhaps this difference may account for its very varying effect in disease. If it acts as a stimulant to the kidneys, its diuretic action should continue as long as the medicine is administered, whereas, with the disappearance of the dropsy, the quantity of urine becomes normal, although the drug is continued. It must therefore, act either by removing the diseased conditions which lessen the action of the kidneys, or it must act by promoting absorption, and bringing the fluid back into the circulation to be eliminated by the kidneys. It does not apparently remove the diseased conditions in the kidneys, for it has no effect on the albumen; as the urine becomes doubled or trebled in quantity, the percentage amount of albumen is greatly lessened, whilst its relative amount becomes correspondingly reduced, the absolute quantity remaining the same. If the amount of albumen is to be regarded as a measure of the disease, then the iodide does not lessen the morbid condition of the kidneys. It may be objected with considerable force, that before the use of iodide of potassium the kidneys were acting very imperfectly, secreting perhaps only a few ounces daily, but after the administration of the drug, they acted freely, and I must admit that this fact tells strongly in favour of the view that the iodide exerts a direct influence on the kidneys. It may indeed act in both ways, directly on the kidneys, and indirectly by promoting absorption.

Dr. Balfour recommends in aneurism iodide of potassium from five to thirty grain doses continued for a considerable time, even for twelve months, conjoined with the recumbent posture and a restricted diet; and he narrates several cases strikingly confirmatory of the efficacy of this mode of treatment. Dr. Chuckerbutty supports his statements. I too have seen on several occasions large doses of the iodide of potassium afford prompt relief in the severe pain from aneurism, the drug presumably acts by lessening both the size of the tumour and its pressure on the nerves.

Iodine has been detected in the blood, saliva, milk, and urine, even in the urine of the sucking child, whose mother was taking iodide of potassium. Its great diffusion-power renders it probable that it might be detected in all the fluids bathing the tissues or moistening the cavities. It appears in a few minutes in the urine, and still more rapidly in the saliva. The rapidity of its absorption is, of course, influenced by the state of the stomach and vascular system, the absorption occurring more slowly when these are replete. The statements concerning its influence on the various constituents of the urine are so discrepant, and the observations made on the subject are so imperfect, that at present our knowledge in this respect must be considered untrustworthy. It is rapidly separated from the body, and, even after large doses, soon becomes indetectible in the urine; indeed, after withholding the drug every trace of it may vanish in less than twenty-four hours. It is stated, on doubtful grounds, that it may be detected in the saliva some days after it has *ceased to appear* in the urine.

Five grains three times a day is generally a sufficient dose. Sometimes, as in rheumatoid arthritis, and in syphilis, no benefit is obtained until much larger quantities, as ten, fifteen, or even twenty grains are given at a dose.

Large doses arrest the rapid sloughing of certain syphilitic sores and promote the healing process. Full doses sometimes succeed when smaller ones fail.

For the removal of syphilitic nodes from the membranes of the brain, five to ten grains, repeated three times a day, is generally sufficient. At first the drug sometimes intensifies the pain, then the disease rapidly declines. In no other affection does this medicine yield such striking results.

Iodide of potassium may be conveniently administered in milk.

BROMIDE OF POTASSIUM, SODIUM, AMMONIUM, AND LITHIUM.

These salts in physical and chemical properties are closely allied to the corresponding iodides; yet in their action on the body, the bromides and iodides exhibit considerable differences.

The persevering use of bromides occasionally produces an acne-form rash, and even boils; effects to be more fully described in a subsequent part of this section. Yet Dr. Cholmeley reports the cure of some obstinate cases of acne by moderate doses of bromide of potassium.

Bromide of potassium, in five parts of glycerine, has proved useful, it is said, as a local application to ease the pain in hæmorrhoids, fissure of the rectum, and in painful growths.

If taken in moderate doses for some time, or in larger doses for a shorter time, bromide of potassium, diminishes the sensibility of the soft palate, uvula, and upper portion of the pharynx, evidenced by the absence of movement in these parts when they are touched. Zœpffel finds that bromide of potassium affects the reflex irritability but not the sensibility of the pharynx; thus, after its use, irritation of the throat will not excite deglutition, but the pain of operations is not lessened. He agrees with Voisin, that thirty grains may be insufficient to affect the pharynx, and that sometimes it may be necessary to repeat this dose two or three times, a few hours apart. It has been recommended to give the bromides to reduce the excitability of the throat preparatory to a laryngoscopical examination; and it is even averred by some writers that merely brushing the pharynx and soft palate with a solution of the bromide, is sufficient to quell the irritability and to permit a laryngoscopic examination with comfort to the patient. Many observers, however, question this use of bromide, and Dr. Mackenzie considers that ice alone can lower the excitability of the pharynx.

Assuming that the bromides possess the property of diminishing the sensibility or the reflex irritability of the pharynx, it was naturally surmised that they would lessen the excitability of the larynx, and thus prove useful in those diseases accompanied by spasmodic contraction of the glottis, as whooping cough and laryngismus stridulus.

It is possible to reconcile the discrepant statement concerning the influence of this remedy on these diseases. Now as to whooping cough, all observers must admit that some cases are altogether uninfluenced by this remedy and it neither lessens the frequency nor the severity of the paroxysms of coughing. In other cases, it appears to control both the frequency and severity. The bromide, I believe, will only be found serviceable in simple uncomplicated whooping cough. If there is fever, or much catarrh of the lungs, if there is pneumonia, or tuberculosis, if the child is teething, and the gums are swollen, red, and painful, or if any gastric irritation exists, then till these complications have been met by appropriate treatment this remedy fails; but when the case has been reduced to a simple form, the bromide of potassium does certainly influence the disease, lessening both the frequency and severity of the paroxysms.

It is thus found to be of most service in the summer, or when the weather is genial and mild. Like other remedies for whooping cough, the bromides are more efficacious in some epidemics than in others.

The efficacy of bromide of potassium on laryngismus stridulus is subject to conditions very similar to those which limit its usefulness in whooping cough. Any irritation, as that from teething, must be removed before the remedy appears to manifest any power.

As, however, in cold sponging, we possess a cure for laryngismus stridulus, ready, prompt, efficient, we need not often have recourse to the bromide. (See Cold Bath).

The bromides are sometimes useful in whooping cough and laryngismus stridulus when complicated with convulsions. During a paroxysm of laryngismus stridulus, or whooping cough, the obstruction in the larynx sometimes becomes so urgent as to induce very imperfect oxidation of the blood, and to cause partial asphyxia, resulting in an attack of convulsions. Convulsions moreover, are not uncommon in laryngismus independent of asphyxia, unaccompanied with an attack of crowing, the early and less developed stage of these convulsive attacks being manifested in carpo-pedal contractions, squinting, &c. The bromides will control the recurrence of these convulsions, even when the disease itself is apparently otherwise uninfluenced.

With regard to laryngismus stridulus, cold sponging is generally sufficient to avert convulsions; but in cases where, from the effects of any irritation, cold sponging is ineffectual, the bromide of potassium, will, in most instances, avert the convulsions, thus obviating one of the gravest dangers of this disease.

The bromide of potassium will much benefit a curious affection we sometimes meet with of a child, which, from the time of his birth, can swallow solids with ease, yet is choked every time he tries to drink. This strange affection is in no way connected with diphtheria or any visible affection, or malformation of the throat.

The bromides, so far as we know, appear to have very little influence on the stomach.

In certain cases, these salts exert a beneficial influence on the intestines; for instance, in a form of colic, which sometimes affects children from a few months to one or two years old. The walls of the belly are retracted and hard, while the intestines, at one spot, are visibly contracted into a hard lump, the size of a small orange, and this contraction can be traced through the walls of the belly, travelling from one part of the intestines to another. These colicky attacks, unconnected with constipation, diarrhœa, or flatulence, occur very often and produce excruciating pain. Sometimes they are associated with a chronic aphthous condition of the mouth. They generally resist all other kinds of treatment but the bromides.

Like the iodides, these salts pass quickly into the blood, and we shall now treat of their influence on the organs to which they are conveyed by this fluid.

The experiments of Brown-Séquard, Meuriot, and Amory, lead them to conclude that bromides contract all the blood-vessels, producing anæmia of the brain and spinal cord, thus diminishing the excitability of these organs.

Certain experiments show that this contraction is probably owing to the effect of bromide of potassium on the va o motor nervous system. The six toes of both hind feet of a frog were quickly cut off, and during the following two minutes eight drops of blood flowed from the right leg and nine from the left. Another frog, after being poisoned by bromide of potassium was treated in the same way, but during the two minutes after amputation two drops only flowed from the right leg. The left sciatic plexus was then divided, thereby cutting off nervous communication between the limb and the vaso motor centres, and in two minutes ten drops flowed from the left leg.

The bromide of potassium induces in animals decided diminution of reflex irritability and of cutaneous sensibility. Experiments render it probable that this diminished reflex irritability is due in part to the effects of the drug on the reflex function of the cord, and in part to its effect on the sensory nerves.

This effect is not due to its action on the muscles or motor nerves; for after complete abolition of reflex action, the muscles still contract on the direct application of galvanic stimulation and the motor nerves still convey impulses to the muscles. Moreover, if the vessels of the hind extremities are first securely tied, and the animal then poisoned, the hind legs in common with other parts of the body lose their reflex irritability, showing that the drug does not expend its force on the muscles or motor nerves since these parts in the hind extremities are protected by the ligature of their vessels. Further, this conclusion is strengthened by the fact, that after the abolition of reflex irritability in a frog it is still capable of voluntary movement. Hence, not only are the muscles and motor nerves unaffected but likewise the motor tract of the cord and the motor centres of the brain. It appears, therefore, that the bromide affects only the reflex function of the cord and leaves unaffected the other parts, certainly the motor tract. Dr. Amory attributes the effects of the bromide on the cord to the contraction of the arterioles and to the diminution of function consequent on the lessened supply of blood to the cord. A very doubtful explanation this, for, in the first place, it has not been satisfactorily proved, that bromides do contract the arterioles; and again if depressed reflex action were due to this cause, surely the other functions of the cord would share this depression, for it seems incredible that only the arterioles supplying that part of the cord devoted to reflex function should be affected; and lastly, in the bloodless frog, when all the blood has been washed out of the vessels and replaced by salt water, rendering the cord completely anæmic, the symptoms produced by bromides do not occur. Bromides depress likewise the sensory nerves, for it has been shown by several experimenters that an animal poisoned by bromide of potassium, yet still possessed of the power of voluntary movement submits to pinching, burning, or pricking without moving or giving other evidences of pain.

In a joint paper by Mr. Morshead and myself, published in the *Journal of Anatomy and Physiology*, we have shown that all the effects described as arising from bromide of potassium on frogs are due to the potash, and further that these effects are producible by all potassium salts.

After a hypodermic injection of a solution of bromide of potassium, in from one to five minutes as soon as a condition, probably due to fright and shock has passed off, the animal recovers complete or almost complete voluntary power, but there is considerable and in some cases every complete loss of sensation; thus pinching a toe either excites no voluntary movement or it is manifested only under sharp and repeated pinching. In six or seven minutes general weakness ensues and slowly progresses till in about an hour paralysis is complete. But before this is induced the animal lies flat on the table looking dead, whilst pinching excites neither reflex nor voluntary action, yet at this time the animal retains considerable voluntary power, being able to hop vigorously though awkwardly. The sequence of the symptoms then, is first, that shortly after the injection complete or almost complete paralysis of the afferent nerves with loss or destruction of reflex action but with voluntary power very little or not at all affected; next voluntary power declines and is at last abolished. We find that chloride and iodide of potassium produce these identical phenomena; that the rapidity of the loss of voluntary power depends on the proportionate amount of potash the salt contains. Thus we always used, as nearly as possible, the same relative amount of each salt to the weight of the animal. So as to give an equivalent quantity of the potash these salts must be administered in about the following ratio:—Chloride of Potassium 1, Bromide 1·5, Iodide 2. Now we found that, on an average, the chloride caused complete paralysis in 40 minutes, the bromide in 55 minutes, and the iodide in 80 minutes, figures standing in about the same ratio as the amount of potash respectively contained in the three salts.

The effect of bromide of sodium is far less energetic, thus in the course of four or five minutes its effects pass entirely away and are indeed probably due to the mechanical shock and not to the direct action of the bromide on the nervous tissues. For the above reasons we conclude that the effects just described depend on the potash in the bromide of potassium, the same results being inducible by other potassium salts. Our observations therefore thus confirm Guttmann's statements concerning the similar action of all potassium salts on the nervous system of frogs, and also Laborde's statement that bromide of sodium even in double the dose of bromide of potassium produces in frogs no characteristic symptoms.

Very large doses of bromide of potassium lessen the frequency and the force of the heart's contractions, shortening the systole and prolonging the diastole and at last arresting the heart in diastole.

Bromide of potassium is used in a variety of diseases, but its virtues are chiefly conspicuous in convulsions.

It is serviceable in all forms of convulsions—in epilepsy, in the convulsions of Bright's disease, and in the convulsions of children, whether due to centric or eccentric causes. Although convulsions may be excited by many causes, it is probable that the conditions of the nervous centres producing the attack are in every instance identical; and it appears to be these conditions which the bromide controls.

In no disease is the bromide of potassium more signally efficacious than in epilepsy, though it is not equally useful in all forms, for this drug leaves attacks of *petit mal* often unbenefited. It is the convulsive form of epilepsy which is so remarkably amenable to the bromide, for in by far the greater number of cases, the fits, under its influence, become much less severe and less frequent. Even when of great severity, and repeated perhaps several times a day, the fit may be postponed for weeks, and even months; nay, in some cases it has been delayed for years.

Cases of the convulsive form, however, occasionally occur, over which the bromide appears to be powerless; the fits recurring as often and as severely as if no medicine had been taken. It is not possible to foretell when the medicine will succeed, and when it will fail. As might be expected, the effects of the drug are most marked when the disease is of short standing.

Dr. Weir Mitchell recommends bromide of lithium in epilepsy. It contains a larger percentage of bromine than either the sodium or potassium salts, and it acts more powerfully, so that smaller doses may be given. Dr. Mitchell thinks the lithium salts succeeds sometimes when the potassium and sodium salts fail. As a hypnotic, he says, "it is superior to the potassium and other salt of bromine." Echeverria thinks it is inferior to the potassium salt in epilepsy, and as a hypnotic superior to the sodium and calcium salts.

Echeverria considers the potassium salt much superior in epilepsy to the ammonium salt. The ammonium salt is more disagreeable to the taste. In epileptic maniacal excitement Echeverria finds bromide of sodium far less serviceable than bromide of ammonium. He moreover asserts that bromides fail to suppress mental excitement in epileptics unless combined with some other narcotic, as conium, cannabis indica, hyoscyamus, chloral (15 to 20 grains each) or still better, ergot of rye.

Brown-Sequard thinks it advantageous to mix the potassium and the ammonium salts, this combination exerting a greater influence on epilepsy than either salt separately, and lessening the risk of bromism. Echeverria disputes these assertions.

In mild epileptic cases, ten grains three times daily is sufficient. When the attack occurs only at night, the best way to avert it is to give at bed-time, a full dose of thirty grains. Echeverria finds that the average dose required is sixty grains daily, but in severe cases a much larger quantity may be needed. In respect to the dose, Voisin says, "I have employed for many years a method which has given me the best results, which consists in determining the condition of reflex nausea by introducing a spoon as far as the epiglottis. I have remarked that a therapeutic dose of the bromide of potassium is not attained till reflex nausea is suppressed; it is not till then that the bulb is certainly acted on, and its excito-motory force diminished...... The study of other reflex phenomena, such as lachrymation, cough and sneezing, enables us to follow the action of the medicine upon the bulb and spinal cord. The dose should not be increased beyond the suppression of reflex nausea, but it should be given continuously for years together. If the malady be ameliorated, or in process of cure, at the end of two years of amelioration, the remedy instead of being administered every day may be given every second, third, or fourth day, provided reflex nausea be always and certainly absent." Voisin considers that the early manifestation of toxic effects is a good, and their late appearance a bad, augury.

If the patient is not cured, but only benefited, by the bromide, it may be continued for months or years. But its administration should be suspended at times for a week or ten days, otherwise the system becomes accustomed to it, when it loses its influence, so that the good effects so well marked originally, cease altogether, the fits recurring with their old severity and frequency. If in such a case the drug is withheld for a time, and then resumed, it again manifests all its previous efficacy.

It has been asserted and denied that chloride of potassium in epilepsy is as efficacious as bromide of potassium.

We have already spoken of the effect of bromide of potassium on the convulsions sometimes accompanying whooping-cough and laryngismus stridulus. The bromide will often prove useful in all other diseases associated with general convulsions. Of course the exciting cause of the convulsive attacks should, if possible, be removed; but even when the cause is indetectible, this salt will often lessen or prevent the epileptiform seizures. The convulsions caused by intestinal worms sometimes resist this remedy completely.

Bromide of potassium will often check the convulsions resulting from simple meningitis, the fits sometimes persisting after the decline of the inflammation, and inflicting serious damage.

Many writers extol bromide of potassium in teething, averring that it obviates irritability and restlessness, and prevents convulsions.

Dr. Begbie has much commended this salt as a soporific. The hypnotic effects, Dr. Clarke and many others consider due to the anæmia of the brain which these salts produce. Too much anæmia he asserts, induces wakefulness, whilst a less degree produces sleep. In this way he explains the different effects of bromide of potassium on himself. After unusual mental or physical fatigue, which he asserts causes anæmia of the brain, forty or fifty grains of bromide by increasing the anæmia, caused sleeplessness, though it soothed and quieted him. When only wakeful from an ordinary amount of mental work, a state when the brain is in a hyperæmic condition, the same dose produced sound and refreshing sleep. Given when the brain receives only the usual amount of blood it produces unusually profound sleep. Voisin referring to his patients in the Bicêtre says, "the hypnotic action upon them was very remarkable night and day. Some were obliged to sleep for a few minutes at a time in the midst of their work. None, in spite of whatever efforts they made to the contrary, could resist sleep directly after their evening meal." It has been found of especial use in obviating that sleeplessness and wandering at night, not unfrequently occurring during convalescence from acute diseases. Often, too, it is of service for the like symptoms during even the febrile stage of inflammatory and specific fevers, as pneumonia, rheumatism, and typhoid fever.

In sleeplessness from other causes, as worry, overwork, grief, dyspepsia, etc., it may be hopefully employed. These remedies are especially indicated if besides sleeplessness, the patient, although of abstemious habits, suffers from delirium, resembling that of delirium tremens.

Bromide of potassium is often of conspicuous benefit in delirium tremens, removing the delusions, calming the delirium, and inducing sleep; and its efficacy is most apparent in the earlier stages, before the delirium becomes furious. Moreover, it is of great service in dispelling delusions which may remain after the partial subdual of the attack.

Dr. Clarke recommends this salt in the insomnia accompanying mental anxiety, hysteria, pregnancy, and "a sort of hyperæsthesia, which I know not how to describe by any other name than general nervous irritability."

To produce sleep, twenty to thirty grains should be given at night; and should this prove insufficient, a like dose may be taken in the morning. Likewise twenty to thirty grains, or even more, may be given in delirium tremens every two hours till the patient falls asleep. The salt often succeeds as a soporific when opium fails. It increases the hypnotic effect of chloral, hyoscyamus, belladonna, cannabis indica, ether and chloroform, and, according to Da Costa, of opium.

Dr. Begbie recommends it for over-taxed brain, either from study, or over-strenuous application to business. It calms the excitement, procures sleep, and dispels the giddiness, noises in the ears, and perversions of the external senses, which often harass these patients. In such cases it is invaluable. He also recommends this salt in acute mania. It is useful too in the headache connected with grief or worry.

There is a group of symptoms variously combined, occurring mostly in women, generally towns-people. The patient is very "nervous," subject often to great despondency, at times so unendurable as to make her, as she expresses it feel as if she should go out of her mind. She is very irritable, is unable to fix her attention, and noises distress her. She sleeps badly, her rest being broken by harassing dreams. This condition often arises from over-work, grief, worry, or too long residence in town or want of change.

The bromide of potassium will always cure this group of symptoms. Their occurrence, independently or associated with other illnesses, as the change of life or migraine, (sick headache, nervous sick headache, bilious headache) is a distinct indication to give the bromide.

The bromide has been often extolled for its efficacy in the symptoms pertaining to the "change of life" and in migraine, and though often very serviceable, yet it often fails. The distressing symptoms occurring during the change of life are very various, but generally occur in definite groups, though these may be more or less combined. The group of symptoms I have just described, commonly occurs at the menopause, and yields almost always to the bromides. This group is often associated with heats and flushings followed by free perspiration and prostration, sometimes extreme. These symptoms too will also generally give way to the bromide. If, however, the heats, flushings and perspirations predominate over the mental depression, nervousness, irritability and sleeplessness, then small doses of nitrite of amyl (see this drug), will generally prove more serviceable than bromide of potassium. Whilst removing the heats, flushings and perspiration, the nitrite of amyl controls the other group of symptoms, quiets the nervous system, produces sound dreamless sleep, and relieves the nervousness and depression. At the change of life patients often complain of much fluttering at the heart, a symptom best controlled by large doses of the astringent preparations of iron (see iron). Indeed, if a patient is anæmic, the bromide or any treatment, though efficacious for a time fails in the long run.

Occasionally the troubles just described yield but partially to the treatment recommended; or, if removed for a time, recur with greater intensity and become unendurable. Then the only resource is thorough change of air and scene, or travelling for three or six months.

In migraine too, (sick headache and its allies) bromide of potassium has been strongly recommended by Drs. Yandell and Davis of America, and Latham of Cambridge, and it is often of great service, though in many cases it altogether fails. In the article on croton chloral I have treated of migraine, and I here merely add that we often find the headache associated with the group of symptoms previously described, namely, nervous depression, sleeplessness, irritability, &c. Perhaps for years previously the patient has been troubled with attacks of migraine at intervals of a month or so. On the occurrence of this group of symptoms, the attacks of migraine become much more frequent and severe; indeed, the pain may become continuous, though at times, generally once a day, it may be paroxysmally worse. The irritability, sleeplessness, &c., are indications of a depressed nervous system which accounts for the increased frequency of the migrainous attacks. With this condition of the nervous system, slight disturbances and causes of irritation bring on severe headaches; sometimes so easily induced, that they occur daily. Bromide of potassium produces refreshing sleep, soothes the nervous system, dispels the other symptoms, and at the same time lessens the frequency and severity of the headaches. Again, derangement of the womb excites migrainous attacks either at a normal or menorrhagic period. Here again, bromide of potassium is useful and its efficacy, when the attacks are caused by menorrhagia, is not entirely due to its checking this condition, for given between the periods, it may improve the migraine before the next attack of menorrhagia. Whilst speaking of uterine disturbance as an exciting cause of these headaches, I may mention that sometimes they are due to uterine mischief generally of the neck of the uterus, and remain rebellious to any treatment till the womb is cured either by injections or by other treatment.

Sometimes during an attack a full dose induces sleep, and after a few hours the patient awakens free from headache. Drs. Yandell and Davis find five or six grains generally sufficient, but they have given half a drachm three times a day. In severe attacks recurring daily, I find fifteen grains twice during the day, and double that dose at night generally required.

Sometimes in the later months of pregnancy, a woman becomes at night the prey of the most frightful imaginings, labouring under the impression that she has committed, or is about to commit, some great crime or cruelty, as the murder of her children or husband. The bromide dispels these delusions, and induces calm, refreshing sleep.

Bromide of potassium is of great service in the treatment of children subject to night screaming, a symptom which appears to be allied to nightmare. Children from a few months to several years old may be attacked with this affection. Sometimes the attack occurs only once or twice a week, as is usually the case with older children; or it may be repeated several times each night. The screaming may last only a few seconds or it may endure for several hours. While screaming, these children are generally quite unconscious of what is occurring around them, and cannot recognise, nor be comforted by, their friends. They are generally horribly frightened. A somewhat similar condition is met with in children a few years old, a state very similar to somnambulism, but sometimes apparently allied to epilepsy. The child gets out of bed while fast asleep, walks about the house, and performs as if awake, various acts, quite unconsciously. This state is not accompanied with any terror. With the screaming and fright, squinting sometimes occurs, which, after some time becomes permanent. In these cases bromide of potassium will prevent the screaming, and remove the squinting. This affection in children being connected very generally with deranged digestion, the condition of the stomach or intestines should be attended to; but even in spite of this derangement the bromide will give quiet and refreshing sleep.

The nightmare of adults will generally yield to the same medicine.

It is soothing in hysteria, giving patients greater control over themselves and preventing hysterical paroxysms.

Dr. Begbie has used the same salt with great advantage in some cases of asthma and of diabetes. It occasionally relieves the pain of neuralgia.

It is also used with decided benefit in certain derangements of the organs of generation. Large doses are said to lessen the natural menstrual discharge. In some forms of menorrhagia it is equal, if not superior, to any remedy we possess; but it is more useful in the flooding of young than of old women. Over that form of flooding due to uterine tumours of various kinds it exerts less control than ergot and some other remedies. To check profuse menstruation, its administration must be regulated by the circumstances of the case. If the loss of blood occur only at the natural period, the medicine is then commenced about a week before: and when the menstrual flux has ceased, the remedy should be discontinued till the next attack is about to begin. On the other hand, if the loss of blood occurs every two or three weeks, or oftener, the medicine must be given without intermission till the loss is controlled; and when the discharge has been brought to its right period and amount, it will still be desirable to give a few doses for a short time before each monthly period. Ten grains three times a day is a dose sufficient in the flooding of young women but much larger doses are required in the more obstinate forms depending on organic changes in the womb. This remedy has been recommended by Dr. Begbie in puerperal mania and nymphomania. Dr. Clarke also says it reduces sexual excitement in those instances of hysteroidal excitement verging on nymphomania. Small doses are unavailing. Not less than twenty grains thrice daily will exert a decided control over excessive sexual propensity.

It also restrains spermatorrhœa. Its employment should be supplemented by cold sponging of the scrotum and perinæum, and the suspension of the testicles in cold water for some minutes, night and morning. Seminal emissions are generally excited by dreams, which may often be avoided by abstaining from suppers and sleeping on a hard mattress. Dr. George Bird has pointed out that seminal emissions occur from undue indulgence in bed, the emissions taking place almost always early in the morning, during the second sleep. He recommends, therefore, that the patient should be roused after six or seven hour's sleep, and should never give in to a second sleep. The observance of this simple means will often cure this otherwise troublesome affection. Dr. Hardman of Blackpool tells me that he has cured some obstinate cases of spermatorrhœa, by directing the patient to empty his bladder on waking from the first deep sleep.

It proves useful in allaying various forms of hyperæsthesia, and sometimes eases the severe pain of chronic arthritis.

Dr. Da Costa finds that bromide of potassium lessens or even prevents many of the disagreeable symptoms of opium, as giddiness, confusion of mind, fainting, headache, and sickness. It manifests this effect over morphia and codia less than over laudanum. A large dose—20 grains—of bromide must be given half an hour before and two hours after the laudanum. Even larger doses are necessary; he even gives 40 to 60 grains some hours before the administration of the opium. Da Costa says the bromide exerts most control over the faintness. He avers also that the bromide heightens the "anodyne or hypnotic effects of opium."

If the medicine is continued for a long time, as is sometimes required in the treatment of epilepsy, the physiological effects of the drug become apparent. "Diminished sensibility, followed by complete anæsthesia of the soft palate, uvula, and upper part of the pharynx, is the first symptom that the patient is getting under the influence of the drug. The sexual organs are amongst the first to be influenced, for there is soon produced failure of sexual vigour, and after a time marked diminution of the sexual appetite itself." (Bazire).

These effects vary greatly; in some the remedy producing only moderate diminution, in others temporary impairment. On discontinuing the remedy the sexual organs regain their lost power. Another frequent result of the prolonged administration of the bromide, is an eruption, generally acneform, occurring most on the face and back, but it may affect even a larger surface. These spots do not generally suppurate, nor do they scar. Echeverria asserts that five or ten minims of liquor arsenicalis, given with the bromide, will prevent this eruption. I have found that iodide of sulphur ointment, frequently applied, considerably lessens the quantity and the severity of these eruptions. The efficacy of the remedy bears no proportion to the amount of acne. The bromide sometimes excites, it is said, eczema and spots like erythema nodosum. The acneform spots may become true boils, and these boils sometimes form large ulcers with conical scabs, looking like rupia. Dr. Weir Mitchell narrates a case of this kind. He found that bromides of potassium, sodium, ammonium, and lithium, produced these ulcers. He tried also bromides of calcium, magnesium, and bromine itself, but as these preparations failed to control the epileptic fits they were not given long enough to determine if they too would produce these rupoid ulcers. Undue administration of the bromide renders a patient low-spirited, easily fatigued and unfitted for work, symptoms which soon subside on the suspension of the medicine.

Acne, and the other evidences of bromism, rarely occur, unless more than one dose, however large, is taken daily.

M. Rabuteau says that bromide of potassium may be detected in the urine and saliva twenty days after the administration of a dose of fifteen grains. Dr. Amory could not find it more than forty-eight or fifty-two hours after a single dose, but after the drug had been taken several days and then discontinued, he could find evidences of it after a longer time. Elimination by the urine is less rapid than absorption by the stomach. Traces appear in the urine in ten minutes. Elimination is most active during the first eight or ten hours, and in less than twenty-four hours the greater part disappears.

Bromide of potassium is conveniently administered in beer or milk.

A THEORY CONCERNING THE TOPICAL ACTION OF ACIDS AND ALKALIES ON SECRETION.

PREVIOUS to treating in detail of acids and alkalies I wish to note their action on the secretions of the body, and to draw attention to a theory which I think explains their action in this respect and at the same time serves as a useful guide to their correct employment in disease.

Acids are powerful stimulants of salivary secretion: the impression from the acid is conducted to the spinal cord and thence reflected through the cerebro-spinal nerves, supplying the salivary glands; and if these are divided, acids cease to augment the salivary secretion.

Repeated and careful experiments have established the fact that dilute acids taken into the stomach check its secretion; alkalies on the other hand powerfully excite the secretion of the gastric juice.

Acids then check acid but increase alkaline secretions; whilst dilute alkalies stimulate acid secretions.

From these facts the more general law is inferred, that acids applied topically check the production of acid secretions from glands, while they increase the flow of alkaline secretions; the very reverse being the case with alkalies, for alkalies applied to the orifices of glands with acid secretions, increase their secreting power; while alkalies applied in a corresponding way to glands with alkaline secretions, lessen or check this secretion.

In support of the generalization I have ventured to propose, I will now adduce some practical instances of the efficient therapeutic employment of acids or alkalies.

The sweat being an acid secretion, the sponging the surface of the body with water weakly acidulated with acids, will in many cases effectually control profuse perspiration.

Acids are useful to allay thirst by promoting, through their topical action on the mucous membrane, the secretion of the alkaline saliva.

Acids given shortly before a meal generally check acidity.

Alkalies given shortly before a meal increase the secretion of the acid gastric juice and so promote digestion.

A weak alkaline lotion is often useful in the weeping stage of eczema by checking the alkaline watery exudation.

A weak alkaline injection is efficacious in that form of leucorrhœa depending on a too abundant secretion from the glands of the os uteri, the secretion in that part being alkaline.

Some of these instances will recur in greater detail in their fitting places in this volume.

Kühne, in his *Physiological Chemistry*, makes some statements apparently opposed to this general proposition. He asserts that alkalies, as well as acids, stimulate the secretion of the submaxillary gland. The secretion produced by alkalies is thick, whitish, and cloudy; but that excited by acids is clear and less viscid. A difference in the characters of the secretions from the submaxillary gland is observed according as the cerebro-spinal or sympathetic nerve supplying this gland is irritated. Irritation of the sympathetic excites a secretion identical with that produced by alkalies; while irritation of the cerebro-spinal nerves excites a secretion identical with that produced by acids. Hence it is inferred that alkalies act on this gland through the sympathetic, and acids through the cerebro-spinal nerves.

No doubt the saliva produced by acids and by irritation of the cerebro-spinal nerves is a true secretion; for it is abundant in quantity, and quickly changes starch into sugar; and irritation of this nerve so greatly increases the flow of blood to the gland that its veins pulsate, and their contained blood is of a bright arterial tint. It is doubtful, however, if the fluid produced by the influence of alkalies or by irritation of the sympathetic nerve is a physiological secretion; indeed Kühne thinks it is due to rapid degeneration of the gland. The quantity of fluid produced by alkalies is very small, and that obtained by irritation of the sympathetic is said to require many hours to produce even a trace of sugar in a solution of starch; but recent researches tend to show that this sympathetic secretion though scanty does very readily convert starch into sugar. The fluid thus obtained contains large quantities of very pale gelatinous bodies, of different forms and sizes, composed partly of albumen and partly of mucin. Moreover, by the irritation of the sympathetic nerve, the flow of blood to the gland is retarded, and the blood in the veins becomes dark and venous in tint. Alkalies produce very little secretion from the parotid gland, and so far as our present knowledge goes, none is excited by irritation of any branches of the sympathetic nerves.

SULPHURIC, HYDROCHLORIC, NITRIC, PHOSPHORIC, AND ACETIC ACID.

The members of this group are powerful acids, and accordingly have a strong affinity for alkalies and bases. Some as sulphuric acid and phosphoric acid, absorb water with avidity. All possess high diffusion-power, and so pass readily through animal membranes and textures. These are the properties which explain most of their actions on the living body.

These acids when concentrated, produce decided changes in the skin by their affinity for the bases and water of the tissues, as well as in a minor degree for the organic substances themselves. Their great diffusion-power, enables them to penetrate readily and deeply beneath the surface, with a continuous destructive action till they are diluted with water or neutralized by the bases of the animal structures. From their great affinity for water, sulphuric acid and phosphoric acid are especially energetic; they withdraw this element from the textures, and thus effect their complete destruction. In adequate quantity, they will destroy the tissues to a considerable depth, and produce a brown or black eschar.

The remaining members of this group, owing to their feebler affinity for water, destroy the tissues less extensively, and their action is much more superficial.

Sulphuric acid and phosphoric acid are never used undiluted, on account of their physical action on the tissues. On the other hand, nitric acid is frequently employed to destroy and remove the surface of foul and unhealthy sloughs and ulcers, and in virtue of a property of which we shall shortly speak, it changes an unhealthy and indolent sore into one more healthy and prone to heal. It is frequently employed in cases of soft chancre, indolent and broken bubo, cancrum labialis, etc.

Nitric, hydrochloric, and especially acetic acid, may produce some vesication. Nitric acid colours the skin characteristically yellow.

They are often used with the best results for the purpose of exciting inflammation. It is now established that two diseased actions cannot co-exist actively in the same part, and on this principle, we use one or other of the three acids, nitric, hydrochloric, or acetic; for instance we apply an acid, usually acetic, to a patch of herpes circinnatus, and thus establish in its place an inflammation which quickly subsides, at once cutting short a disease, which tends to spread and to persist for a considerable time. Thus, too, it is that nitric acid induces a healthier action in indolent ulcers, or arrests the spreading of sloughing sores.

Acetic acid, and somewhat diluted nitric acid, are frequently applied to warts, which are destroyed by withdrawing the bases, and by dissolving the tissues of the warts themselves. But although any of these acids are effectual, and in many cases completely remove the warty growths, yet sometimes a fresh and abundant crop springs up in the neighbourhood of those undergoing treatment. Dr. George Bird finds the glacial acetic acid very effectual in removing warty growths. Small syphilitic warts and condylomata kept constantly moist with a wash of diluted nitric acid, a drachm or two of the dilute acid to a pint of water is sufficient, are thus surely and painlessly dispersed.

The members of this group are more generally employed externally mixed with water. Although diluted, they still excite a beneficial irritation, and may be used as lotions in urticaria, controlling the very troublesome itching, even preventing the formation of wheals, and in some cases appearing to be mainly instrumental in curing this disease.

Acids, especially nitric acid and hydrochloric acid, are less employed as baths than formerly, yet beyond doubt, they exert a very powerful influence on the skin. A general bath, with two to eight ounces of the strong nitric or hydrochloric acid, is a very active exciter of a torpid skin. Whether these baths have any effect on the other organs of the body is at present quite unknown, no experiments having been made to settle this question. It is highly probable, however, that in common with other materials dissolved in baths, these acids remain unabsorbed by the skin, and that any change in the deep parts of the body resulting from medicated baths, must be ascribed to the direct action of the dissolved materials on the skin itself. Sponging the surface of the body with water weakly acidulated with acids will in some cases, effectually control profuse sweating, the sweat being an acid secretion.

They, however, act as stimulants to the skin when stripped of its cuticle; thus nitric acid is frequently used with much benefit, as a lotion in the treatment of indolent and painful ulcers.

Applied to the softer tissues, the dermis, mucous membranes, etc., acids act as astringents, causing a direct condensation of the tissues, probably by removing part of the base, by combination with which the albuminous substances were held in the soluble form.

By virtue of their astringency they check profuse secretions from unhealthy sores. Nitric acid is mostly preferred in such cases. Nitric acid is generally used as a test for albumen in solution; it precipitates the albumen by abstracting the base combined with it, and in setting the albumen free, converts it into an insoluble substance.

When diluted, these acids very effectually check bleeding from the smaller vessels and capillaries by constringing the tissues, exciting the muscular coat of the arteries to contract, and by coagulating the blood in the ends of the wounded vessels, and so plugging them. Vinegar, always at hand, will check bleeding from leech-bites, piles, cuts, etc. The vinegar should be diluted.

These acids produce the same effect on the mucous membrane of the mouth as on the skin, and for the most part are used for the same purposes. Strong nitric acid is often applied to foul and sloughing ulcers of the mucous membrane to change their character and to check their progress.

Acids are, in part, neutralized by the alkaline secretion from the salivary glands, while any acid remaining free precipitates the mucus coating of the mucous membrane, and if in sufficient quantity attacks the mucous membrane itself. They act beneficially as astringents, when the lining membrane of the mouth is relaxed or ulcerated, as in ulcerative stomatitis, salivation, etc.; but other astringents are preferable. These acids being apt to dissolve the earthy constituents of the teeth, should be taken through a quill, a glass tube, or reed.

Nitric acid exerts a further action on the mucous membrane of the mouth, and may be given in small medicinal doses with conspicuous benefit when this membrane is inflamed or diseased in various ways as in ulcerative stomatitis, aphthæ, salivation from mercury, or when reddened, inflamed, and glazed, a condition not unfrequently met with in great irritation of the digestive organs.

These, with other acids, as citric, tartaric, etc., quell the thirst of fever patients much more effectually than simple water, especially if the drink is made rather bitter with some agreeable-tasting substance, as orange-peel or cascarilla. Much of the troublesome thirst of fevers is solely due to dryness of the mouth and throat. This disagreeable local sensation of thirst is very liable to lead fever patients to drink more water than is really good for them, producing loss of appetite, indigestion, and even diarrhœa and flatulence. (*Vide* Water.)

The action of acids in lessening thirst has already been explained in the chapters on the topical action of acids and alkalies on the secretions. As we have seen, acids probably increase alkaline secretions, and thus the acid drinks used by fever patients promote an increased secretion in the salivary glands. Bitters, as we shall presently see, possess the same power; hence, acid and bitter drinks, acting on the salivary glands, keep the mouth and throat comfortably moist and quench the thirst. By lessening the harassing thirst they comfort the patient, quell irritability of temper, favour sleep, quiet the pulse, and diminish the heat of the body. Organic acids, are largely employed as fever medicines.

Acids are applied to the throat for the same purpose as to the mouth. Undiluted nitric acid acts beneficially as a topical application, on the foul sloughs or ulcers occurring in the course of scarlet fever or other diseases.

Bretonneau warmly recommends the application of strong hydrochloric acid to the throat in diphtheria. The acid may be used undiluted, or it may be mixed with an equal part of honey, which gives the mixture consistence, and makes it cling about the parts on which it is painted. It should be applied only to those spots of the mucous membrane attacked by the diphtheritic inflammation and not to the neighbouring healthy tissues, where it would produce active inflammation. The diphtheritic membrane being very prone to implant itself on inflamed surfaces, the application of the acid to the sound tissues by exciting inflammation, might favour the spread of the disease.

Nitric acid, in small medicinal doses, may be given with benefit when the throat presents the same appearances as those of the mouth previously described. [*Vide* p. 100].

The albuminous constituents of food are digested and rendered soluble mainly by the agency of acids, but all acids are not equally efficient. Lactic and hydrochloric acids far outstrip all others in this respect, while sulphuric acid hinders rather than promotes digestion, by precipitating the albumens in an insoluble form. The action of acids on nitrogenous substances is intensified by the addition of pepsin.

In scanty secretion of gastric juice, dilute hydrochloric acid may be employed to assist digestion. The considerations developed in the section on the topical action of acids and alkalies on the secretions, render it obvious that the time of administration, in respect to meals, is all important. If given before a meal, acids check the secretion of the acid gastric juice, and so hinder, instead of aiding, digestion. Where the secretion is scanty, the acid must be given after the meal, when the secretion from the membrane of the stomach is completed; the additional acid will assist the action of that secreted naturally, but too scantily. In many cases of atonic dyspepsia, alkalies are preferable to acids; but they must, of course, be given a short time before a meal, because then they stimulate an abundant secretion of the gastric juice. In most cases of atonic dyspepsia, alkalies given with the precautions noted, are superior to acids given after the meal, although, as is well known, certain cases occur where acids answer better than alkalies. In such cases, the mucous membrane is presumably considerably damaged by excesses in eating or drinking, and owing to degeneration of the glands of the stomach, no stimulant could excite a sufficient flow of gastric juice.

Acids as we have seen, will check or lessen the secretion of gastric juice. In many stomach diseases, or from its sympathy with distant organs, the follicles pour into the stomach an excess of acid, which undue secretion may be checked by the administration of acids shortly before food. But acidity of the stomach is often due to excessive or irregular fermentation leading to the production of a large quantity of various acids, as acetic, butyric, and lactic; and this excessive or irregular fermentation of acids is itself checked by acids; and as undue secretion of the gastric juice, or excessive formation of acids by fermentation, are the two causes of acidity, we have in acids themselves remedies able to control and check the acidity of the stomach, and relieve the consequent distressing symptoms, whether due to pregnancy,* uterine disease, calculus of the kidneys, the various indigestions, or more serious diseases of the stomach.

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* Two or three drops of tincture of nux vomica taken a few minutes before meals will often obviate the acidity of pregnancy. Sometimes ipecacuanha will control it.

Practical men indeed know well that the administration of an acid will remove acid eructations, heartburn, and the sense of discomfort at the chest and epigastrium, arising from excess of acid in the stomach. Hydrochloric or nitric acid is generally preferred, and small medicinal doses, separately or combined, are ordinarily sufficient, provided the prescribed conditions are obeyed.

Patients are sometimes greatly annoyed by eructations of an offensive gas, with the odour and flavour of rotten eggs—a gas evidently consisting largely of sulphuretted hydrogen. The late Dr. Day, of St. Andrews, noticed that in such cases the urine is loaded with oxalic acid and in their treatment he strongly recommended the employment of mineral acids. Dyspeptics with oxalic acid in the urine, who suffer from great mental depression, but who are free from sulphuretted hydrogen eructations find much benefit from nitric acid treatment.

In the treatment of dyspepsias, a clue to the administration of acids on the one hand, or of alkalies on the other, may sometimes be obtained by testing the reaction of the fluids ejected from the stomach. Not unfrequently, soon after a meal, a fluid regurgitates almost unconsciously into the mouth, sometimes so strongly acid that it sets the patient's teeth on edge. The exhibition of nitric or hydrochloric acid shortly before each meal, almost immediately removes this acid pyrosis. Sometimes the fluid of pyrosis has an alkaline reaction, often accompanied with much distress, with nausea and vomiting of the just-eaten food, and the rejected contents of the stomach generally show a strong alkaline reaction. Here an acid immediately after a meal relieves the nausea, the vomiting, and all distressing symptoms. On theoretical grounds, we should expect that an alkali administered shortly before food would yield even more satisfactory results, but in such cases I have had no experience of alkalies.

It need hardly be repeated that acids given soon after a meal to patients troubled with acidity and heartburn, greatly aggravate the suffering. It is adding fuel to fire. If continued too long these remedies may not only check undue acidity of the stomach, but even exceed this office, and by lessening the secretion of gastric juice to an undue extent, actually induce the very opposite condition to that for which in the first instance, they were, employed. Those who have watched the action of acids on the stomach, well know that, if too long continued, the improvement first noticed ceases by degrees, then fresh symptoms arise, which, strangely enough are relieved by the very opposite treatment which had previously benefited.

Too long a course of acids excites catarrhal inflammation of the mucous coat of the stomach and intestines, often accompanied by diarrhœa, and even by general wasting. This damaging action of acids explains the occasional thinning effects of vinegar, when taken for a long time, by fat people. Vinegar is sometimes taken surreptitiously in wineglassfuls several times a day to reduce obesity. This foolish practice which cannot be too strongly condemned may thin the patient but it does so at the expense of serious injury to the body. Obesity can be reduced by harmless means.

These acids are inoperative to check the growth of sarcinæ in the stomach; and they often fail even to check the acidity accompanying these growths.

It is a common practice with drunken soldiers to drink a wineglassful of vinegar in a tumbler of water, to cut short intoxication; but whether it does sober a drunkard is not certain, but it seems to steady a tipsy soldier and to enable him to pass muster on presenting himself at barracks.

By virtue of their astringent action, and their power of coagulating the blood, acids are useful in bleeding from the stomach. Sulphuric acid is generally preferred to the other members of this group. But many other astringents are surer.

Owing to their high diffusion-power these acids pass readily from the stomach into the blood. The acids which pass into the intestines must, to a great extent, become neutralized by the alkalies of the bile and pancreatic juice, and therefore as acids, can, by direct contact, affect to a very small extent, the middle and lower part of the intestinal tract. But as they become neutralized, some of the biliary and weaker acids are set free, heightening in some degree the acidity of the contents of the intestines.

Dilute acids are used as antidotes in poisoning by alkalies. It has been shown experimentally that acids applied to the mucous membrane of the duodenum cause an increased flow of bile, attributed to the consequent contraction of the gall bladder and bile ducts. I suggest that part at least of this augmented flow is due to increased secretion brought about in accordance with the alkali—acid (V. Section 7) theory, I have propounded, the acid contents of the duodenum stimulating the secretion of the alkaline bile and the still more alkaline pancreatic juice.

It has long been held that nitric acid acts in some way beneficially on long-standing diseases of the liver, as in chronic congestion and cirrhosis, and that it will augment the flow of bile after the liver has struck work from the excessive use of mercury.

There can be no doubt that sulphuric acid is highly useful in checking summer and choleraic diarrhœa, although as it is generally administered with opium and warm carminatives, it is difficult to distribute to each remedy its exact share of merit. Its mode of action is less obvious than its efficacy. It may control the formation of acid in the intestines, or it may act as an astringent and so check diarrhœa. If then, it acts as an astringent, as the acid is soon neutralized and converted into a sulphate in the upper part of the small intestines, losing its astringency at once, its influence on the lower and middle part of the small intestine must be exerted through nervous sympathy between one part of this canal and another. Sulphuric acid is considered to act often capriciously, giving rise to much uncertainty in its administration; but the lack of uniformity in its results can be accounted for, in many instances, by the dose; a small medicinal dose often benefits, whilst a full one by increasing the acidity of the canal, may even aggravate the diarrhœa. Dr. Neligan and other authorities, recommend it in chronic diarrhœa, and to control the "profuse sweating and colliquative diarrhœa of hectic."

In small medicinal doses, nitric acid is of great use in many diarrhœas; it often acts admirably in the straining diarrhœa of children, when the motions are green, curdled, and mixed with mucus. This form of diarrhœa yields speedily to acids, which counteract the acidity of the intestinal canal, on which this flux depends. Yet, on the whole, other remedies are to be preferred to acids. Nitric acid may sometimes be used with great benefit, especially when given with pepsin, in that chronic diarrhœa of children when the pale and pasty motions smell sour and disagreeable.

Strong nitric acid is an efficient remedy for internal piles, two, or at most three applications to the enlarged and dilated vessel being sufficient; it should not be applied to the whole surface, but only to one or two points. It is useful, too, in granular or ulcerated piles. It produces little or no pain. A superficial slough follows, and after the separation of the slough the contraction of the sore diminishes the size of the pile. A drachm or half a drachm of the dilute nitric acid to half a pint of water, is an excellent lotion for bleeding piles, staying the hæmorrhage, constringing the swollen and inflamed tumour, and easing the heavy, tensive, wearying pain. Acids are reputed to heighten the action of purgative medicines, and for this purpose sulphuric acid is sometimes employed. Sulphuric acid increases the purgative effect of extract of aloes. Acids are usually added to purgative salts, as Epsom salt, when a tonic and bracing action on the mucous membrane is desired, as in many cases of anæmia of young women.

If not already neutralized on their passage into the blood, these acids must at once become so, and it would appear that thenceforth their history must follow that of the salts they form. Yet the received notion of the action of these acids on the organs of the body is so different from that of any of their salts, that the behaviour of the acids must be spoken of separately.

On combining with the alkalies of the blood, the acids must set free some weaker acids, and so to a slight extent lessen the alkalinity of that fluid, as is evidenced by the increased acid reaction of the urine following the use of mineral acids. What further effects they may have on the blood is at present quite unknown. They are reputed to be tonic and bracing, but the improvement in the general health may more safely be attributed to their action on the intestinal canal. Still, they do produce certain changes in the fluids and solids of the body, since in the absence of lime-juice or fresh vegetables, acids, especially vinegar, act as preventives of scurvy.

Dr. Rees recommends large doses of lime juice to the extent of eight ounces daily, in acute rheumatism. Dr. Inman speaks highly of this treatment, and observes that neither tartaric, nor citric acids, nor lemon juice can be substituted for lime-juice.

Nitric acid is recommended in secondary syphilis. It has been said sometimes to induce salivation; if so, this may have been due to the direct action of the acid on the mucous membrane by increasing the alkaline secretion of the salivary glands.

Acids seem sometimes to abate the rapidity of the pulse in fevers; a result not due probably to the direct action of the acid on the heart or nervous centres, but more likely to the relief arising from diminished thirst. Sulphuric acid, especially in conjunction with sulphate of zinc, checks the profuse sweating of phthisis and other exhausting diseases; Dr. Graves ascribed a similar action to vinegar and often used this favourite receipt; Distilled vinegar, ℥ ij. Laurel-water, ʒ ij. Syrup, ʒ vj. Aqua, ℥ v. An ounce or two ounces to be taken every third or fourth hour. Sulphuric acid is supposed to check bleeding from the lungs or womb. It is difficult, indeed, to understand how an ordinary dose of sulphuric acid can exercise such an influence after becoming so greatly diluted by admixture with the blood, and the difficulty is enhanced by the consideration that these acids, either before or immediately after their entrance into the circulation, are converted into salts, as sulphates, nitrates, and phosphates. Whatever influence therefore, is exerted on distant organs must be effected through these combinations; yet we cannot ascribe to any salts of these acids, properties similar to those ascribed to the acids themselves.

In such questions, experience is a safer guide than speculation. The subtle influence of even small doses on distant organs of the body is well exemplified by the effect of these medicines on the mother's milk; for acids taken for some time, induce in the child sickness, diarrhœa, and colicky pains.

Phosphoric acid has been recommended in diabetes. Griesinger, who has carefully studied the action of this medicine, considers that it does more harm than good. He employed the acid, to the extent of an ounce daily, and found that this dose increased the sugar. Since the members of this group augment the acidity of the urine, it has been proposed to dissolve phosphatic calculi by artificially acidifying the urine; but as these acids only slightly augment the acidity of urine they must be taken for a prolonged period before they could materially diminish the bulk of a stone; moreover, there remains the insuperable objection that this method of treating calculi would seriously damage the mucous membrane of the stomach and intestines.

The injection of nitric acid, sufficiently diluted, has been employed with success by some eminent surgeons, and is a far more effectual treatment for phosphatic calculi. The experiments of Dr. Roberts of Manchester on the solvent power of dilute solutions of this acid on calculi after their removal from the body lead him to the conviction that this treatment is worthy of much wider application than at present obtains: moreover, by neutralizing the urine, if alkaline, and preventing its decomposition, nitric acid injections protect the mucous membrane of the bladder from the irritation of the alkaline urine.

The further influence of sulphuric, nitric, and hydrochloric acids on the urine is unknown. Of the influence of acetic and phosphoric acids we shall speak in another place.

It should be remembered that phosphoric acid may possess many other properties than those already specified; but these will be referred to in speaking of the phosphates, for it is in this form that phosphoric acid exists in the blood, and manifests many of its beneficial effects on the diseased body.

SULPHUROUS ACID, SULPHITES, HYPOSULPHITES.

Sulphurous acid is commonly used as a deodorizer and disinfectant. It is a deodorizer by virtue of its power to arrest putrefaction; hence it may be used to prevent bad smells, but it possesses little or no power to decompose offensive gases, and therefore, it is of little service in destroying foul odours. It arrests fermentation by destroying the minute organisms which determine this process. It is ranked among disinfectants, but at present, for this purpose, its value is undecided. It is supposed that contagious diseases are produced by minute organized particles and that sulphurous acid will destroy them. If these conjectures are correct, sulphurous acid may take rank as a disinfectant.

It must be borne in mind that sulphurous acid corrodes metals, so that, when used as a disinfectant, these should be protected by a covering of some greasy substance. In fumigating a room, sufficient sulphur should be burned to render the air unfit for respiration, and the escape of the gas by the chimney, windows and crevices of the doors should be prevented. It is better to repeat this process three or four times at intervals of twenty-four hours. To disinfect a bed, Mr. Startin recommends that a warming-pan containing live coals sprinkled with sulphur should be put between the clothes, till the sulphur is consumed. A damp napkin held before the mouth will prevent the sulphurous acid irritating the lungs. It is far better, however, to submit the bedding, etc., which cannot be boiled, for some hours, to a temperature between 250 and 300 in a disinfecting chamber or oven.

The quickest way of curing itch is to immerse the patient, leaving his head free, in a gaseous bath of sulphurous acid, made by burning 12 drachms of sulphur in a suitable apparatus. Whilst in the bath, the patient's clothes should be baked, so that in half an hour he is cured of his itch and is made free from risk of re-infection.

The acid will cure chloasma, by destroying the parasite on which the disease depends. The acid of the pharmacopœia, mixed with an equal quantity of glycerine, may be used, (Garrod). Warm baths should also be employed to remove the cuticle infested by the parasite. It is useful also in favus, and in tinea tonsurans; but when these affections are unusually obstinate, its action should be assisted by epilation.

Dr. Dewar of Kirkaldy, has drawn attention to the beneficial action of sulphurous acid in various diseases.

Dr. Dewar applies the sulphurous acid in three ways,—as a solution, by fumigation, and by the spray-producer. A solution of the acid or fumigation with it, he says, will speedily cure chilblains and chapped hands. Equal parts of the acid of the pharmacopœia, and of water or glycerine, will, he states, at once ease the burning, and prevent the spread of erysipelas. Wounds and sore nipples he treats with the solution, constantly applied, either neat or diluted. Bruises, he says, may be prevented or quickly removed by the same treatment.

According to the same authority, many internal diseases are equally amenable to sulphurous acid; amongst others, cold in the head, influenza, tonsillitis, malignant sore throat, (scarlatinal or otherwise), laryngitis, chronic bronchitis, chronic phthisis, asthma, croup, clergyman's hoarseness, and typhoid fever.

The acid may be applied to the throat by fumigation or by inhalation: a few drops should be added to boiling water, and the steam inhaled; or the acid may be applied by a camel-hair brush, or by the spray-producer.

It may be carried into the lungs by fumigation, inhalation, or by spray. If properly and carefully employed, the pharmacopœia acid excites scarcely any irritation or annoyance. The application of sulphurous acid may be conducted in the following ways:—

"Put a few red cinders into a kitchen shovel, set this upon a wooden stool, and then sprinkle flowers of sulphur from time to time till the room is not inconveniently filled with smoke."

The spray may be applied by a vaporizer now in common use furnished with vulcanite tubes constructed upon Dr. Dewar's plan. For a child the instrument should be held about three feet from the mouth, and the fine spray should be inhaled and the process repeated according to circumstances. In an acute attack of diphtheria with no time to lose, it may be repeated hourly, or even oftener.

In applying the spray to adults, Dr. Dewar directs the operator "to hold the nozzle of the instrument about six inches from the patient's mouth, and administer three or four whiffs to begin with; then, after a corresponding interval, during which a cough or two is given, the process is repeated, about twenty squeezes, in all, which represents the injection of from forty to sixty minims of acid. The acid should be pure."

For the relief of rheumatism and gout, besides the fumigation, Dr. Dewar advises that the bed clothes should be exposed to the strong fumes, and then spread over the patient, who after sweatting and sleeping wakes much relieved.

The solution, either strong or diluted in various proportions, speedily removes thrush. Dr. Lawson speaks highly of sulphurous acid, as a remedy for pyrosis; indeed, he says it never fails to be of service. The sulphite he finds useless.

Sulphurous acid in doses of five to ten minims often prevents flatulence produced by fermentation, and is especially useful when the gas is abundant. It is more efficient than sulphites and hyposulphites.

Sulphites, administered by the mouth, will, it is said, prevent decomposition and putrefaction of urine in the bladder.

Sulphites and hyposulphites have been employed to destroy sarcinæ and torulæ in the stomach.

It is said that hypo-sulphite of soda, in fifteen to twenty grain doses every two hours, will cure intermittent fever.

CHROMIC ACID.

Chromic acid was first used as an escharotic by Mr. John Marshall, of University College, who employed it to remove warty growths from the nose, genital organs, and elsewhere. Immediately after touching the parts with chromic acid, Mr. Marshall applies lead lotion, "which restrains the subsequent inflammation, relieves the subsequent soreness, and does not in any way neutralize or retard the rapid effects of this apparently useful escharotic." He uses a solution containing a hundred grains of crystallized chromic acid to an ounce of water. "The solution is best applied by the aid of a pointed glass rod, or, when a large quantity is needed, by means of a small glass tube, drawn to a point. Only so much should be applied as will saturate the diseased growth, avoiding the surrounding healthy mucous membrane, for, though the solution is not sufficiently powerful as an escharotic to destroy or even vesicate the mucous membrane, it may give rise to an unnecessary amount of inflammation." "Any superfluous acid may be removed by a piece of wet lint. The first effect of its application to the warts is to produce a slight smarting pain. If, however, any ulcerated surface be touched, the pain is of a burning character, more lasting, but not so acute and intolerable as that caused by nitrate of silver or by nitric acid, with or without arsenious acid. Under its influence the morbid growths rapidly waste, in some cases being thrown off altogether, and in others undergoing a partial, though evident, diminution in size. The best immediate dressing is dry lint, afterwards the part may be washed with lead lotion, and dressed with lint moistened in the same." "In most cases one application suffices, the cure being completed in from four to eight days. In severe cases, where the warts are large, repeated applications are necessary." Mr. Marshall further states that "chromic acid solution neither burns nor stains linen; it all washes out."

A solution of this acid is said to allay itching, but the kind of itching is not mentioned.

Group embracing CAUSTIC POTASH, SOLUTION OF POTASH, CARBONATE AND BICARBONATE OF POTASH, ACETATE OF POTASH, CITRATE OF POTASH, and the corresponding preparations of SODA, POTASH SOAP, SODA SOAP, BORAX.

THE members of this group are all endowed with very high diffusion-power, the potash in a greater degree than the soda salts. All are very freely soluble in water. With the exception of the acetates and citrates of potash or soda, they have an alkaline reaction, weak in some, as the biborate of soda, but very marked in others, as caustic potash or soda.

They dissolve the nitrogenous constituents of the animal textures; and their solvent power is in proportion to, yet distinct from, their affinity for water.

Owing to their affinity for water, and their solvent action on the nitrogenous tissues, several of these substances, by abstracting the constituent water, will destroy the skin or other structures to a considerable depth. The caustic alkalies possess a greater affinity for water, and therefore a more solvent and destructive action on the tissues than the remaining members of this group. The carbonates and solutions of the caustic alkalies come next; while the bicarbonates, acetates and the rest of this group, are comparatively feeble agents.

The caustic alkalies, undiluted, or sometimes mixed with caustic lime to lessen their activity, are often employed to destroy warty growths or the hard edges of some unhealing sores, such as chancres, or to open abscesses, or to make issues.

It must be borne in mind that in common with the rest of this group, the caustic alkalies, possessing a very high diffusion-power, will penetrate the tissues and destroy them widely and deeply; unless great care is taken the undue diffusion of the alkali, will destroy a far larger amount of structure than is intended, producing a large slough and leaving of course a correspondingly large sore. The application of the alkali should always be checked before it has taken full effect, since the destructive effect will continue for some hours; other precautions should likewise be observed, or the caustic alkali dissolved in the fluids of the tissues will run over a large surface, subsequently destroying it. In making an issue, pieces of plaster with a hole in them of the required size, should be placed one over the other and the caustic applied to the skin exposed through the hole, while the neighbouring parts are effectually protected. As soon as the application is finished, it is desirable to wash the surface with vinegar and water, to neutralize any remaining alkali. The caustic, very slightly moistened, should be rubbed on the surface till it assumes a dull bluish look, and till the cuticle is softened and easily rubs off, when the application of a poultice will help the separation of the dead parts, and ease the pain.

A solution of a member of this group sponged over the peccant part will often allay the troublesome itching accompanying many skin diseases. A weak solution of the caustic salt, or of its carbonate, is best. A solution of carbonate of potash or soda, containing a drachm of the salt to a pint of water, applied with a small piece of sponge, is often of extreme comfort in urticaria or lichen. A solution of the same strength, of cyanide of potassium, which has also a strong alkaline reaction, is perhaps, a still more effective application.

The itching of many other eruptions, as of scabies, eczema, pruritus ani, and pruritus vulvæ, and prurigo from lice, yield better to other applications, which are indicated elsewhere.

The carbonates of the alkalies are employed in the treatment of itch, either as soap, or in the form of ointment, to remove the superficial and dead cuticle, and so to break up the burrows of the itch insect.

By virtue of the alkali it contains, soap facilitates the removal of the scales of psoriasis.

In the treatment of eczema, a weak solution of carbonate of potash or of soda finds much favour. I have no doubt of its usefulness in the early and middle stages of the disease, when the red and raw surface weeps copiously; but when the weeping has ceased, and especially when mere desquamation remains, the alkali fails to be of use, and other applications are preferable. Dr. Hughes Bennett recommends a solution containing half a drachm of carbonate of soda to a pint of water, and the affected surface to be kept constantly moist by a thin piece of lint, soaked in the solution and covered with oilskin, or with a piece of lint spread with simple ointment. A weaker solution acts sometimes still better. Like the oilskin, the ointment prevents evaporation but is less "heating" and is more comfortable to the patient. This treatment is an instance of the general proposition (*vide* section on the topical action of alkalies and acids on the secretions) of alkalies as local applications, checking an alkaline secretion; for the fluid which oozes so abundantly from eczematous surfaces is strongly alkaline, and an alkaline application very speedily checks the abundant weeping.

It must be admitted, however, in some instances, that an alkali appears to irritate the skin, a result often due to an over strong solution. During this treatment attention must be paid to the state of the digestive organs, and any irritation produced by teething or worms, should be attended to.

It is sometimes useful to wash the moist and weeping eczematous surface night and morning with soap and water, which in many cases checks the secretion, and allays the heat and irritation. If a strong soap is too irritating, a milder one must be used. In chronic forms of eczema, Hebra recommends the application of liquor potassæ, or of the stronger solution of caustic potash. He advises that liquor potassæ should be brushed once a day over the surface, and, if it produces much smarting, the residue must be washed off with cold water. When the skin is only slightly infiltrated and thickened, he employs a solution composed of two grains of caustic potash to an ounce of water; but when the infiltration is greater he uses a solution containing from five to thirty grains or more to the ounce. These stronger applications must be employed only once a day, and must be quickly washed off with cold water. This treatment speedily allays itching, but is liable to make the skin brittle, and to obviate this condition, Dr. McCall Anderson applies every night either cod-liver oil or glycerine. Dr. Anderson frequently employs alkalies in conjunction with tar or oil of cade. He recommends the following prescription: "Equal parts of soft soap, rectified spirit, and oil of cade. A little of this to be firmly rubbed over the eruption night and morning and washed off before each re-application." Mr. Startin condemns the use of soap in eczema, or in any skin disease, using instead a wash consisting either of yolk of egg and water, or milk and water.

Sponging the head several times a day with a saturated solution of borax and water is an effectual application in pityriasis of the scalp; it at once eases the itching, loosens the scales, and cleans the head. Pityriasis often gives way in a short time to this treatment; although, unfortunately, after a variable period the affection generally returns, which indeed happens when the disease is removed by other treatment. Should the pityriasis prove rebellious, glycerine of borax often proves more useful, as it keeps the scalp continually moist with the weak alkaline preparation. This plan is useful, too, in eczema of the ears and scalp.

Acne punctata generally yields to hot water and plenty of soap several times a day, a treatment which keeps open the orifices of the sebaceous follicles and prevents the accumulation of the abundant secretion. If this treatment roughens, reddens, and irritates the skin it should be well rubbed with glycerine of starch after each washing.

Free ablution with soap and water is very effective in decomposing and removing the acid irritating secretions which keep up the intertrigo so often infesting the buttocks of children, or in the irritation in the folds of the skin of stout children or underneath the breasts of fat women. After carefully drying the parts, they should be smeared over with some greasy application, which is generally preferable to dusting powders, as starch powder or oxide of zinc. Caustic potash or soda is sometimes used to open abscesses with the intention of preventing scarring.

Alkaline baths are often employed, but their action on the skin and its secretion is not yet satisfactorily determined; like acid or simple baths, they lessen the acidity of the urine.

Soap with excess of alkali will induce pityriasis of the face which will often disappear at once on substituting oatmeal or a milder soap as "Compressed glycerine soap" or "Solidified glycerine."

A weak solution of bicarbonate of potash or soda, a drachm of the salt to a pint of water, is a useful injection to check leucorrhœa, when this discharge depends on an increased secretion of the glands of the os uteri. This secretion is strongly alkaline, and when unduly abundant, the efficacy of alkaline injections in such cases is another proof of the general proposition that alkalies check alkaline secretions.

When the leucorrhœal discharge is clear, like white of egg, or when it is lumpy, but not yellow, three or four injections will generally check it. On the other hand, when the discharge is yellow and puriform, the injection may fail; although, in many cases, when this yellow discharge is due to mere abrasion of the os uteri, the injection, continued for one or weeks, will change the yellow to a white discharge, and so times cause even this to disappear. If the leucorrhœa is produ by displacement of the uterus, or ulceration of its neck, this jection, like many others, may temporarily check the discharg but it soon returns, and in such cases the leucorrhœa cannot cured till these conditions are removed.

The success of this injection obviously depends on its reac ing, and coming well in contact with, the os uteri, the offendi part; hence it is necessary to give full and careful directions to its use. The patient should be directed to lie on her back, raise the buttocks by placing a pillow under them, and then introduce the syringe as far as she conveniently can, and leave the injection in the vagina about five minutes. The inje tion should be used cold, when it can be borne, twice or thre times in the day. A Kennedy's syringe, by means of which an quantity of lotion may be forcibly injected, and which, by washing away the discharges and douching the part with a cold o warm medicated application, is even more effectual.

Mr. Norton, of St. Mary's Hospital, ingeniously employs a solution of liquor potassæ (two drachms to the ounce of water) in the treatment of ingrowing toe-nail. "A piece of cotton-wool is saturated with the solution, and pressed gently down between the upper surface of the nail and the soft tissues. The solution permeates the substance of the nail, and softens and pulpetizes the superficial cells. The wool is kept constantly moist with the lotion, and the softened tissues are wiped away each morning. The nail in a few days becomes thin and flexible, and, if desired, it can be pared away without pain. The lotion should be continued until all ulceration has disappeared."

Sir J. Simpson recommends borax in "the pruriginous eruption which appears on the mucous membrane of the vulva, and extends up along the vagina as far as the cervex uteri. It may also extend, and is sometimes indeed originally situated on, the cutaneous border of the vulva, and appears on the outer cutaneous surface of the labium, spreading backwards along the perinæum to the circle of the anus. Accordingly it is a flitting and transient affliction, recurring with menstruation, pregnancy, or delivery. It may be more fixed, and last weeks, or months, or years, producing constant irritation and distress, frequently interfering with rest and sleep, and rendering the thus enabling the sore to heal. The citrate of lithia is to be preferred; but a strong solution of citrate of potash is nearly, if not quite, as useful. It probably converts the biurates into neutral urates, and in this more soluble form the urates are carried off through the skin. Equal parts of citrate of potash and water may be used. Neither the solution of citrate of lithia, nor that of citrate of potash, irritates the skin. As might be expected, this treatment takes many weeks, or even months, to effect considerable reduction of large deposits.

Borax and honey, or the glycerine of borax is often used in aphthæ. In aphthæ the mucous membrane is usually covered with small, round, sharply cut superficial ulcers, covered with a pultaceous exudation. Aphthæ naturally runs a short course, and when left untreated gets well in most cases in a week or ten days. The same preparations are useful in removing the curdy exudation of thrush.

Dr. Corson finds, that a piece of borax the size of a pea, dissolved in the mouth, acts magically in restoring the voice, in cases of sudden hoarseness brought on by a cold, and frequently for an hour or so, it renders the voice "silvery and clear."

Borax is useful in the hoarseness common among clergyman and singers.

The action of the members of this group on the stomach was somewhat anticipated when it was shown that alkalies increase the secretions of the gastric juice, and may thus prove useful to promote digestion. It is obvious, however, that method must be observed, or the contrary effect to that intended will ensue; for if given soon after a meal, the alkalies will neutralize the acid of the gastric juice, and effectually retard and impede digestion. Alkalies intended to increase the quantity of gastric juice, and to promote digestion, must be taken a short time before a meal. The alkaline saliva swallowed at the beginning of a meal is highly useful; although, as it must speedily become neutralized by the acids of the stomach, its action must be but temporary. Alkalies may be usefully administered in many forms of atonic dyspepsia, and in other forms associated with deficient secretion of the gastric juice. The bicarbonate of soda is the salt generally employed.

When on the other hand, a patient complains of heartburn and acid eructations, these disagreeable symptoms may at once be removed by the exhibition of an alkali, as the bicarbonate, which neutralizes the excess of acid in the stomach; but it must always be remembered that this treatment is merely palliative. No doubt a course of alkaline treatment appears sometimes to remove acidity; but the good attributed to alkalies may with great probability be ascribed to the tonic with which they are generally combined. The bicarbonates are preferred to the more caustic salts on account of their milder action, while the acetates and citrates are neutral, becoming alkaline only by decomposition in the intestines or blood. The bicarbonates being milder can be continued longer than the more caustic preparations; but they have the disadvantage of giving off much carbonic acid gas, which may cause trouble from distention of the stomach. To prevent this, magnesia, which is an alkali, and acts like the members of this group, may be substituted if the bowels are confined, or lime-water if they are relaxed.

Alkalies are apparently sedative to the stomach, at least they often relieve the pain of this organ. Liquor potassæ is generally employed in such cases.

In cases of poisoning by any of the acids, alkalies the least irritating to the stomach are employed to neutralize and to prevent the further action of the acid on the tissues.

In poisoning by metallic salts and alkaloids, the same salts, namely, the bicarbonates of the alkalies, may be used, to precipitate the insoluble oxide of the metal or of the alkaloid. Magnesia, as it acts as a slight purgative, and so helps to expel the poison from the intestinal canal, is generally preferred.

By virtue of their diffusion-power, the substances contained in this group pass so readily into the blood, that but a small portion of them reaches far into the small intestines. Little is known of their action on the small intestines, and on the organs which pour their secretion into them; yet it seems probable that those secretions having an alkaline reaction may be affected in a double and opposite way, according to the period of administering these drugs. The secretion from the intestinal glands is alkaline; hence, if the general proposition elsewhere formulated be valid, acids applied to the orifices of the ducts should augment their secretion, while alkalies should have the contrary effect. But we have seen that alkalies, given before meals, increase the secretion of the acid gastric juice, and thus augment the acidity of the intestinal canal; they should likewise increase the biliary and pancreatic secretion. On the other hand, if given after a meal, alkalies neutralize the acid in the stomach, and should lessen the secretion from the liver and pancreas. On these points, however, nothing is known with certainty, the foregoing statements being merely conjectural.

The milder alkalies, as bicarbonates of potash, soda, or magnesia, may be used with great benefit in diarrhœa, caused by excess of acid in the intestines. By neutralizing the excess of acid, these substances arrest the diarrhœa.

Soap is often added to anal injections, to suspend castor oil or turpentine. Soap itself, moreover, may be used as a mild and safe purgative. A piece the size of the thumb, covered with castor oil or merely wetted with water, and thrust up the rectum as high as the finger will carry it, in a short time will produce an easy, copious, and natural evacuation. This plan is especially available for infants and children.

On entering the blood, alkalies undergo various changes, according to their composition. The acetate or citrate, which has not already undergone a like change in the intestines, becomes converted into the carbonate, the form probably ultimately assumed by the oxide of the alkalies.

The alkalinity of the blood must therefore be increased by these alkalies, not probably to any great extent, as from their high diffusion-power they are rapidly eliminated by the kidneys. There has been much speculation concerning this increase in the alkalinity of the blood. The alkalies are known to promote oxidation, whence it has been conjectured that its oxidation, and that of the tissues, may be increased by increasing the alkalinity of the blood. It has been suggested that alkalies might be profitably employed in diabetes to promote the oxidation of the sugar. Alkalies have been advocated also for excess of uric acid in the urine, with the expectation of oxidizing this product of the nitrogenous tissues and so converting it into urea or some other substance. Alkalies are sometimes given to fat people to increase oxidation, in order to consume the superfluous fat, and so to control unseemly obesity. The solutions of the bicarbonates and especially of the oxides are occasionally and I should think unsuccessfully used for this purpose.

The action of alkalies in diabetes appears to be nil, or rather, it should be said, they in no degree lessen the amount of sugar separated by the kidneys, although, if long persisted in, some derangement of the stomach must occur, with diminution in appetite, so that less food being taken, less sugar is excreted.

Nor does it appear that alkalies can oxidise uric acid in the blood; at least there are no experiments in proof of this. It is, however, very useful to give alkalies so as to render the urine weakly acid, or even alkaline, so as to convert the excessive quantity of uric acid into a more soluble urate. This treatment, too, will prevent the growth of uric acid calculi.

Micturition in young male children not unfrequently causes severe pain, traced to the existence of uric acid or biurates, in the form of spicular crystals, which in their passage irritate the urethra. By alkalinising the urine, these crystals are dissolved and rendered innocuous. The citrates having very little action on the mucous membrane of the stomach are the salts best adapted to deacidize or to dealkalize the urine.

As to the power of alkalies to increase the oxidation of fats, it is clear that the long-continued administration of the more alkaline preparations will induce much wasting of the body, admits of no doubt, but this is effected by the disordering action on the mucous membrane of the stomach.

To diminish fatness in a way so likely to damage health, and even to endanger life, is surely a mistake. Some writers of authority insist that obesity may be thus reduced without any ill effects on the mucous coat of the stomach; Dr. Neligan states that he has often removed an uncomfortable excess of fat by the use of liquor potassæ, without in any way injuring the patient's general health. Though occasionally successful, this treatment generally fails signally.

After the passage of alkalies into the blood, and their conversion into carbonate, the action of these substances on that fluid is at present but little known. Dr. Garrod is of opinion that scurvy is due to deficiency of potash salts with the food, a surmise supported by many facts, but not yet confirmed by exact observation.

The bicarbonate or citrate of potash is often employed in rheumatism. This disease is supposed to be produced by an excessive formation of lactic acid, which, having an affinity for certain tissues of the body, excites in them the rheumatic inflammation. Alkalies are given to neutralize this acid, and to protect the tissues from its action. But so little is known about the nature of rheumatism, that it is impossible to approach the question of its treatment on the theoretical side. As careful and exact observations of this treatment are non-existent we can only be influenced by individual impressions. This much, however, must be conceded; that in many cases rheumatic pain is much relieved as soon as the patient is well under the action of an alkali and the urine has ceased to be acid.

Many eminent authorities are firmly convinced that the alkaline treatment renders rheumatic fever both milder and shorter, and diminishes the danger of heart complications. I have made many careful observations on this question, and am led to believe that, due attention being paid to the age of the patient, and to the nature of the rheumatism, it will be found that these salts are unavailing either to lessen the intensity or the duration of the fever.

In the fifty-second volume of the *Medico-Chirurgical Transactions*, Drs. Gull and Sutton published a paper on the value of remedies in rheumatic fever. The cases quoted, although not numerous enough to settle this much-vexed question, lead them to the conclusion that alkalies, lemon-juice, or blistering, do not shorten the course of rheumatic fever, but it is not denied that these remedies may allay pain. They further conclude that neither alkalies, lemon-juice, nitrate of potash, nor blisters, prevent the occurrence of heart disease in rheumatic fever. In dealing with statistics relating to the treatment of rheumatism, it is necessary to be specially cautious; the present tendency, warranted by observation, leads to the conviction that hereafter rheumatism will be discriminated into many varieties. Already we have distinctive rheumatic fevers, due not only to weather influence, but to syphilis, lead, etc., and it is often difficult and at first even impossible, to distinguish gonorrhœal rheumatism and acute febrile rheumatoid arthritis from rheumatic fever. In rheumatism there is a large unworked field of enquiry.

The influence of age too in acute rheumatism must be taken into account. Thus in children the attack is sharp and short declining even when untreated in from five to ten days; and whilst the danger to the heart is much greater than with adults, the joint affection is so slight that in an acute attack, with a temperature varying between 103 and 104, the child may not even complain of joint pain, or complain so slightly that the nature of the case may easily be overlooked.

Fever in a child, with even the slightest pains in the joints, leads us to investigate carefully if we have not to deal with an attack of acute rheumatism. On the other hand, in middle-aged and old people, slight fever is generally accompanied by severe pain in many joints whilst the danger to the heart is almost *nil*, and the attack is often chronic. Again the fatality of rheumatism is much influenced by age. Rheumatic hyperpyrexia, the most common cause of death in acute rheumatism, rarely occurs in children or in middle-aged people. Children rarely die of acute rheumatism, indeed I have never seen a child die of this disease. The foregoing observations make it obvious that in testing the efficacy of remedies we must take care not only to discriminate one kind of rheumatism from another but to compare cases occurring in persons of much the same age.

The frequency of relapse in acute rheumatism is well recognized. I believe this relapse is in many cases explicable and avoidable. Thus I have found that when the temperature has become nearly normal, rising only to 99·5, to 100, or a little over, there may be no pain, especially in the case of a child, and the patient feels so well that he is often allowed to get up and walk about, at the great risk of bringing back the fever and joint-pain. In the ward, I have frequently verified the fact that relapses are often brought about in this way, and I am sure it is much safer to take care that the temperature should become normal and remain so for several days before the patient is allowed to get up. These cases will illustrate the importance of the thermometer, as so slight a degree of fever is quite indetectible by the hand. But the temperature must be taken several times a day as the preternatural rise may last only a few hours daily. Movement of the joints in rheumatic fever inflames them and heightens the fever; if a joint free from inflammation and pain is worked by the hand for a short time it often becomes in a few hours acutely painful and red. Again, it is well known that the journey to the hospital often excites inflammation in patients' joints and heightens the fever, so that simple rest during the few first days in the ward almost always causes a diminution of pain and fever.

Potash salts exist abundantly in the milk, whence it has been suggested that the administration of these salts may promote this secretion.

The sustained administration of the alkalies and their carbonates renders the blood, it is said, poorer in solids and in red corpuscles, and impairs the nutrition of the body. These results are probably due to disordered digestion, produced by the long-continued use of alkalies, and are not dependent on an excess of alkalinity of the blood; such excess must always be slight, on account of the rapid elimination of these salts by the kidneys. It has been shown by Dr. Roberts, of Manchester, that the citrate of potash may be taken for an almost indefinite time, without deranging the general health, yet this drug increases the alkalinity of the blood, while, owing to its neutral reaction, it is harmless to the stomach.

Liquor potassæ bears the reputation of promoting the absorption of inflammatory formations, and is occasionally employed in pleurisy; but its good effects are not evident, and the disorder it produces in the stomach renders its use unadvisable for any length of time.

Carbonate of potash, in one or two grain doses, given three or four times daily, with a little syrup to cover the taste, is much used in Philadelphia for whooping cough.

What influence have the alkalies on tissue change? Dr. Parkes has investigated the action of liquor potassæ, and he thinks that it probably increases the disintegration of the nitrogenous substance of the body. He believes that his experiments justify him in concluding that it disintegrates also the sulphur-holding tissues; for liquor potassæ increases both the urea and the sulphuric acid of the urine. The strong reaction of liquor potassæ unfits it to be given in doses sufficiently large to affect in any great degree the reaction of the urine, so that when it is required to alkalinize this fluid the bicarbonates or citrates must be employed.

What action have alkalies on the constituents of the urine? They are all reputed to be diuretic, but as no exact observations have been made with these salts this statement must be regarded as only a probable assumption.

Before referring to the presumed diuretic properties of these substances, it will be well to digress for a short space to speak in general terms of diuretics.

By diuretics, we understand medicines which act as eliminators of the urine; and we must distinguish diuretics from those medicines which, by promoting tissue change, cause an increase in any of the constituents of the urine. Diuretics merely separate from the system already-existing products.

As the urine is a complex fluid containing, besides water, many salts and other ingredients, we may have medicines which will eliminate one or more of these substances leaving the rest unaffected. We may therefore have diuretics of water, or of urea, or of uric acid, &c. The retention in the blood of materials, which should be eliminated by the kidneys, may be due to a variety of conditions. The physical state of the kidneys may be altered, and these organs disabled by disease of distant organs, as of the heart. Or, through insufficient oxidation and combustion of the effete products of disintegration, refuse materials may remain in a form unexcretable by the kidneys; and, lastly, the retention of the urinary ingredients in the blood may be dependent on organic disease of the kidneys themselves.

Thus, in one instance a medicine acting on some organ at a distance from the kidneys, as the heart or lungs, will be a diuretic; while in another, those means which promote oxidation in the blood will prove diuretic; and, lastly, diuretics may act immediately on the kidneys by removing or altering those physical conditions which hinder the action of these organs.

How far do the members of this group act as diuretics? and in which of the foregoing ways? We cannot give very satisfactory answers to these questions.

First as to their diuretic action.

It is generally held that all these substances are diuretic, and, under certain circumstances, they may possibly become so. Acetate of potash and acetate of soda enjoy the highest repute in this respect, though some careful observations have been made with these substances on persons in health, which have led to unexpected results. It was found by Böcker (quoted by Parkes), "that so far from acting as a diuretic in health, the acetate of potash diminished the water, the urea, the extractives, and in a remarkable manner, the earthy salts." Some valuable observations concerning the action of citrate of potash and acetate of potash, as diuretics in health, have been made by Dr. Nunneley on himself. He took daily, for twelve days, three to five drachms of citrate of potash. On an average, the daily excretion of water was increased by two ounces and a half, but the urea was lessened by eighty-four grains, and the solids by sixty grains. The acetate of potash, in daily doses of from two and a half to three and a half drachms, exerted a similar influence in a somewhat less degree.

But should we expect medicines to act as diuretics or eliminators in healthy persons? In their blood there should be but little urea or uric acid to be eliminated, and we must be careful, how far we allow physiological experiments on healthy subjects to guide us as to the action of diuretics in disease. That such caution is highly necessary is shown by the experiments of Ranke, who after giving acetate of potash, noticed a very considerable increase in the quantity of urine voided soon after, showing that this salt will sometimes act as a diuretic of water.

So far as to their diuretic properties, and we will endeavour now to answer the second part of the foregoing question:—In what way do they act as diuretics?

It is not supposed that any members of this group act on organs remote from the kidneys. They may possibly promote oxidation in the blood, and so reduce effete products to urea, in which form they are separated by the kidneys.

Some of the alkalies are considered to be febrifuge, as the citrates and acetates. If so, they would act as eliminators of water, as on the decline of fever an increase takes place of the urinary water, previously held back in the system during the febrile state, and often accompanied by a simultaneous increase in the solids of the urine. If, therefore, these substances will check fever, this increase of water and solids must, in some measure, be due to their action.

These alkalies are generally reputed to act as diuretics when the kidneys are diseased, the citrates and acetates being given in acute and chronic Bright's disease. By making the urine alkaline, some consider it is enabled to dissolve the organic, but diseased, matters which block up the uriniferous tubes in Bright's disease, and hinder the secretion of the kidneys.

It has already been mentioned that the members of this group render the urine less acid, or even alkaline; but strange to say, the amount of acid excreted with the urine is actually increased, but being neutralized by the alkalies, it gives no acid reaction.

The citrates and bicarbonates are constantly employed to render the urine alkaline, when the urinary organs are irritated or inflamed, as in cystitis and gonorrhœa. If in cystitis, the urine, before it is passed, is already alkaline from decomposition of the urea, alkalies must be intermitted; for they would, of course, increase the alkalinity of the urine, and as alkaline decomposes much more readily than acid urine, they would still further promote the decomposition of urea, and the formation of carbonate of ammonia.

When excess of uric acid occurs in the urine, it should be kept for a time alkaline; and by many careful and ingenious experiments, Dr. W. Roberts, of Manchester, has shown that uric acid calculi may probably be dissolved in the bladder, if the urine is maintained alkaline for some weeks. This treatment is probably useful in renal calculus which is generally composed of uric acid only. It is reasonable to expect that the alkaline urine would in time reduce the calculus sufficiently to pass down the ureter. We certainly meet with patients complaining of much pain in the back, passing bloody urine containing a large quantity of uric acid crystals and a little pus, who are curable with large doses of citrate of potash.

We may here introduce a summary of some interesting experiments made by Dr. Paul Guttmann, which confirm many of the conclusions of Claude Bernard and others on the action of potash and soda salts. The results are singular, and scarcely in accordance with medical experience of the action of these substances on the human body.

POTASH SALTS are all far more poisonous than soda salts.

Potash salts are all equally poisonous and equally fatal in the same space of time, if administered in the same way.

Chloride of potassium, carbonate of potash, and nitrate of potash, in identical doses, are equally powerful to destroy life, and in the same period of time, even when either salt, previous to injection, is mixed with a solution of albumen.

The acid of the salt plays no part in the fatal result.

In poisonous doses great muscular weakness sets in, first appearing in the hinder extremities; while in warm-blooded animals dyspnœa and convulsions take place. Large doses lessen the frequency and force of the heart's beats, and sometimes make them irregular. This holds good with all potash salts. Large doses at once arrest the action of the heart, which always ceases to act in the diastole.

Traube asserts that the action on the heart is effected through the vagi nerves. Guttmann considers this view erroneous, as, after the vagi were both divided, and the medulla removed, the potash salts still affected the heart as before, and even when the vagi was paralyzed by woorali, the potash salts still acted as usual on this organ. Whether their effect on the heart is owing to their action on the heart's substance, or on its ganglia, Guttmann cannot say. He states that these salts lower the temperature of the body; but certainly to a very insignificant extent.

These salts act but slightly on the muscles, and not at all on the peripheral nerves, unless applied directly to them in a strong form. The loss of sensibility and motion is due to their paralyzing action on the spinal cord, an action first evidenced and most expressed on the hind part of the cord.

SODA SALTS, in twice or three times the quantity which proves fatal in the case of the potash salt, produce no effect on the system, except a passing weakness.

Even in larger doses, soda salts exert no action on the heart, cause no diminution in the temperature, and produce no apparent effect on the cord, brain, nerves, or muscles.

The heart of a frog suspended in a solution of potash quickly ceases to contract, whilst it takes a much longer time to produce a like effect in a solution of soda of similar strength.

Many soda salts produce an opacity of the lens in frogs, but this does not occur with sulphate of soda. Guttmann shows that the opacity is not due to mere abstraction of water from the lens; though this condition is removed by immersing the opaque lens in water. This opacity does not take place in mammiferous animals.

Some experiments on chloride, bromide, and iodide of potassium, I made in company with Mr. E. Morshead, lead us to conclusions similar to those arrived at by Guttmann. We find that these three salts produce the same symptoms in the same order, and with an intensity proportioned to the amount of potash they contain. They at first depress or destroy the function of the afferent nerves, and thus diminish or destroy sensation and reflex action. Reflex action, Guttmann's experiments show, is depressed also by the direct action of the potash salt on the reflex portion of the cord. When the function of the afferent nerves are depressed or even abolished, the animal retains perfect voluntary power. Hence the brain, the motor tracts of the cord, the motor nerves and muscles are unaffected, next general paralysis begins, increases, and at last becomes complete, due as Guttmann has shown to the further effect of the salt on the cord. (See Bromide of Potassium.)

SOLUTION OF AMMONIA, CARBONATE OF AMMONIA, SPIRITS OF AMMONIA.

These preparations have many properties in common with the alkaline potash and soda group. They possess a strong alkaline reaction, are freely soluble in water, have a high diffusion-power and dissolve the animal textures. They differ from the potash and soda preparations in their volatility, and in being more powerful local irritants of the living animal tissues, exciting very active inflammation.

Their action on the skin is in many respects similar to that of the alkaline potash and soda preparations. Owing to the water in its composition, liquid ammonia manifests but little attraction for that of the tissues; and since its solvent action on the textures is less than that of the soda or potash salts, its destructive powers are much less rapid and extensive. Owing, however, to its high diffusion-power, it readily penetrates the cuticular covering of the body, and excites a degree of active inflammation sufficient to destroy the tissues, and so produce, first a slough, then an ulcer. The preparations of the members of this group are never purposely employed to produce formidable destructive changes in the tissues, but are used in the form of liniment, or the solution of ammonia itself, as vesicants and rubefacients.

The strong solution may be employed when it is wished to produce very speedy vesication. A few pieces of lint should be cut a little larger than the required blister, and on the lint should be poured ten or twenty drops of the strong solution of ammonia; the pledget must be applied at once to the skin, and covered with a good sized watch-glass. Heat, with some smarting and tingling, is soon felt, and in a short time a rim of redness appears around the glass, denoting that the application has done its work; then a poultice promotes the vesication, and eases the burning pain. In this way a blister may be produced sometimes in ten minutes but it may take half an hour; so great is the difference in the vesicating action of ammonia, that with some a blister is not formed at all. Hence it must be considered a very uncertain vesicant.

As a rubefacient or "counter-irritant" it is more useful; but it is in no respect superior to a mustard poultice, the materials for which are always at hand. The liniment of ammonia if merely rubbed or dabbed on the skin, acts very imperfectly as a counter-irritant. It must be applied on lint, or linen, kept in contact with the skin, when decided rubefaction takes place in a few minutes.

As a counter-irritant ammonia is used for the same purposes as mustard poultices or blisters.

Dr. Tilt speaks highly of Raspail's sedative lotion in the treatment of headaches produced by the change of life or by defective uterine functions. This lotion, made by adding two ounces of liquor ammoniæ and of common salt respectively, and three drachms of camphorated spirits of wine to thirty-two ounces of water is applied to the painful part with a small sponge and is renewed as often as may be required. It excites a sensation of burning and reddens the scalp. If too strong, it should be diluted with water.

The weaker solutions of ammonia are sometimes applied to the bites or stings of insects, as wasps, spiders, &c., to neutralise the formic acid, the active principle of the poison.

Formic acid is commonly said to be the poisonous principle in insects, whose bites or stings excite pain and inflammation. This I think can hardly be correct. The sting or bite of an insect affects some persons much more than others. The bite of a bug or flea will in one person cause considerable swelling whilst in another it will excite neither pain nor swelling. Even in the same person we find perhaps that when young, insect bites or stings scarcely affected him whilst later in life they cause much swelling and pain. Again, a bug bite will cause great swelling, whilst in the same individual a gnat, a flea, or midge, will cause no inflammation. The bite of a midge, too, will excite considerable swelling with much itching, lasting eight or ten days, whilst in the same person the bites of other insects are quite innocuous. Now this difference could not be if the active principle were always the same. It is evident therefore, that there must be some difference in the nature of the poisons secreted by different insects, and that it cannot depend on formic acid; or were this always present in the poison of insects it must be mixed with some other virus differing in different animals.

Salts of ammonia applied to the nose, and breathed into the air-passages, are commonly used in fainting and in poisoning by narcotics, in the early stages of cold in the head, and as derivatives to remove pain and inflammation of the nose and frontal bones. Ammonia inhalations have been recommended in chronic bronchitis to ease and probably to lessen the over-abundant expectoration.

Ammonia in the stomach acts much in the manner as it acts on the skin. It neutralizes the acid it encounters, and is therefore an antacid; at the same time, if incompletely neutralised, it acts as an excitant, or even irritant of the mucous membrane.

Soon after the administration of ammonia, a sensation of warmth at the pit of the stomach sets in, which quickly spreads to the rest of the body. When the functions of the stomach and upper part of the intestines are depressed it may be used as an excitant. It often obviates spasm of the intestinal canal, and braces up the relaxed mucous membrane. Ammonia compounds of this group are therefore among the best anti-spasmodics. They are useful remedies for children, especially for infants, who are frequently tormented by colic or flatulent distension of the intestines brought on by bad feeding.

These preparations may be profitably employed in the after-stages of diarrhœa, after the removal of the irritating excitant cause, when the mucous membrane continues to pour out a watery secretion which perpetuates the diarrhœa.

The alkaline preparations of ammonia are employed in flatulent distension of the stomach and intestines, with the view of absorbing the excess of gas, generally consisting of carbonic acid. In such affections these remedies no doubt are often temporarily useful as palliatives. They excite the muscular coat of the intestine to contract, and so promote the expulsion of the distending gases.

In full doses these remedies excite an increased formation of mucus, and even vomiting; as emetics they act without inducing nausea or depression. They are seldom employed alone but are used to counteract the depressing effects of other emetics.

If administered too long, they excite catarrh of the stomach and intestines.

These substances readily enter the blood, and must to some extent increase its alkaline reaction; but owing to their volatility and high diffusion-power they are rapidly eliminated, and therefore exert only a transient action on the blood and the organs of the body.

The effect of ammonia on the blood is at present unknown. It has been maintained, without much show of proof, that carbonate of ammonia is the poisonous agent in uræmia; the urea it is said decomposes in the blood, forms this carbonate, which in its turn produces the serious symptoms constituting uræmic poisoning.

Ammonia induces a slight increase in the force of the pulse, some excitement of the brain, and a general sensation of warmth. Being a slight stimulant of the heart, ammonia is used in fainting and exhaustion. It is frequently administered as an antispasmodic—an action depending probably in part, on its power to strengthen the heart's action, but, like all other antispasmodics, its influence is brief.

Carbonate of ammonia is often employed as a stimulating expectorant in chronic bronchitis, when the expectoration is profuse, and the patient's strength is diminishing. It is often given with chloride of ammonium, which probably acts in a similar manner. Carbonate of ammonia is frequently of signal service in severe bronchitis, or broncho-pneumonia of children, especially when they are prostrate and livid from obstructed breathing.

Carbonate of ammonia, in three to five grain doses, administered uncombined with any other drug, hourly, or every two or three hours, according to the severity of the case, has been much landed in scarlet fever. It was largely used by the late Dr. Peart, who, "did not lose one patient out of nearly three hundred." The late Mr. Wilkinson also employed it largely with equal success; and recently Mr. Charles Witt has written a pamphlet extolling its virtues. It is said to be useful in all forms of scarlet fever, especially when given early. The immediate effects are stated to be diminution of heat, fever, and delirium, and a disposition to sleep. Mr. Wilkinson says it is equally useful in measles, and that the ammonia treatment leaves no secondary evils. Mr. Charles Witt says, care must be taken that no acid drinks nor acid fruits of any kind are permitted, or the ammonia, becoming neutralized, loses its efficacy. Solution of acetate of ammonia, is a useful diaphoretic and is largely employed in fevers. It is especially useful in the milder forms, as in common catarrh. A full dose of acetate of ammonia, or Mindererus' spirit, will often speedily steady and sober a drunkard. The supposed effect of ammonia in preventing iodism is noticed in another place.

Owing to its high diffusion-power, ammonia escapes very readily from the body in various ways, a portion passing with the breath, some probably with the sweat, and much with the urine.

MAGNESIA, LIGHT MAGNESIA, CARBONATE OF MAGNESIA, LIGHT CARBONATE OF MAGNESIA, SOLUTION OF CARBONATE OF MAGNESIA.

These substances having an alkaline reaction, might be placed in the group of potash and soda alkalies, but the effects of the magnesia group on the body are in many respects very different from those of the potash and soda group. We have elsewhere treated of the properties pertaining alike to all alkaline substances, including, of course, the members of this group. (See Potash group.)

Some of the oxide of magnesia combines with the acids of the gastric juice and becomes soluble; the remainder, being unaffected, is left insoluble. Part of the carbonate, decomposed by the acids of the stomach sets free its carbonic acid.

These substances act as antacids and as antidotes in poisoning by the strong acids and by some metallic salts. In some cases they are preferable as antacids to bicarbonate of soda or lime.

The advantages of the members of this group are—(1) their large saturating capacity for acid; (2) their purgative property; (3) their harmlessness, on account of their insolubility, when given in excess.

Their disadvantage consists in their great bulk. The oxide or carbonate of magnesia is generally used as an antacid; but the oxide is preferable, as the carbonate by giving off much gas, may produce disagreeable distention of the stomach. It must not be forgotten that they are merely temporizing remedies, and that acids are far better correctives of acidity of the stomach. (See Acids.)

The oxide of magnesia is a convenient antidote to the strong mineral or vegetable acids. It neutralizes them and protects the delicate structures of the stomach from their corroding action; and it precipitates many metals from their acids, rendering them less soluble, and therefore less poisonous. The magnesias form an insoluble compound with arsenic, and thus take rank among the antidotes to this poison.

The magnesian salts combine in part with the acids of the gastric juice. The oxide and carbonate on account of their insolubility cannot pass into the blood, nor does the chloride pass in any amount because of its low diffusion-power. Hence almost all the magnesia passes into the intestines.

In the intestines the salts of magnesia undergo changes according to their composition. The chloride probably is decomposed by the bile, and the oxide precipitated, part of which combines with the biliary acids. The oxide is converted first into the carbonate, then into the bicarbonate by the carbonic acid of the intestines, and so made soluble, and capable of acting as a purgative. The carbonate is changed in a similar manner into the bicarbonate, and likewise becomes a purgative. Thus they act as purgatives only after conversion into bicarbonates, in which form they possess most of the properties of the group which includes sulphate of magnesia, etc. Like the members of this group, the bicarbonate has a very low diffusion-power, and, like them, it is purgative; its action in this respect being very mild, it is termed a laxative. Their mild action, freedom from taste, and antacid property, fit these substances admirably for children. They are generally combined with a little rhubarb. If unduly employed, they occasionally accumulate, and form concretions of ammonio-magnesian phosphates in the intestines.

Bicarbonate of magnesia, fluid magnesia as it is termed, is a useful and mild aperient.

Magnesia has been lauded in sympathetic vomiting, as that of pregnancy, when it is to be presumed the vomiting depends on excessive secretion of acid from the stomach; but its effects are very transient. Should it fail, recourse may be had to oxalate of cerium (one grain every three hours), ipecacuanha, quinine, acids, etc. (See Ipecacuanha).

The chief of the magnesia passes out with the fæces, and, for the reasons stated, a small portion only enters the blood. In excess of uric acid, members of this group prove useful by saturating much of the acid in the stomach, and carrying it out of the body.

LIME, CAUSTIC LIME, LIME-WATER, LINIMENT OF LIME, SACCHARATED SOLUTION OF LIME, CARBONATE OF LIME.

This group contains highly valuable medicinal substances which might with advantage be more extensively used.

Lime is a necessary constituent of the hard and soft tissues of the body, of bone and the parts more vitally endowed, as the nerves and muscles; wherever there is active growth, whether natural or unnatural, lime salts are found in excess, probably as phosphate, being in all likelihood the form of lime required by the body for the performance of many of its functions. In practice, however, we find the other salts of lime of equal service in almost precisely the same morbid states in which the phosphate is so valuable, and it seems feasible that a portion of the lime salts becomes united in the body with phosphoric acid.

Their diffusion-power being very low, and having little affinity for animal structures, when applied to the skin they produce very little change. But caustic lime, having a strong attraction for water, will withdraw it from the dermis when deprived of its cuticle, and to some extent effect the destruction of the tissues. Yet, as its diffusion-power is slight, it fails to penetrate the tissues, and its action is superficial. Caustic lime is not often used as an escharotic. Mixed with caustic potash, it forms a compound less deliquescent, far more manageable and safer than simple caustic potash, especially in affections of the neck of the uterus, as first pointed out by Dr. Henry Bennet.

Applied to broken skin and to sores, the carbonate and lime-water are slightly astringent; hence lime is sometimes used to check the discharge from sores and skin eruptions.

Lime-water and oil, in equal quantities, or in the proportion of four of lime-water to one of oil, enjoys a high reputation in the treatment of burns.

Lime-water is of service as a lotion to cracked nipples.*

Lime-water is sometimes employed to check the abundant discharge of certain skin diseases, as eczema, and likewise as a sedative to ease the smarting and tingling. When the inflammation of eczema has been subdued, the discharge being great, lime-water and glycerine form a useful and comforting application.

Carbonate of lime is sometimes used as a dusting powder in eczema or intertrigo, to absorb the abundant secretion, to prevent discharges from irritating the already inflamed skin, and to protect the skin from the air. In common with other dry powders, carbonate of lime is inferior to some simple, bland, or slightly stimulating greasy application. Certain cases, however, are certainly more benefited by dry powders, as oxide of zinc, bismuth, and carbonate of lime, than by ointments.

As we have said, carbonate of lime is used for intertrigo of the buttocks and perinæum of young children, and to protect the skin from the irritation of the urine and of the air. Napkins soaked in urine being very generally the cause of this eruption, it is obvious that greasy applications afford a more efficient protection, since the powder readily absorbs discharges, becomes itself irritating to the skin, cakes and cracks, leaving parts of the surface exposed. The best treatment indeed consists in frequent ablutions with soap and water, and anointing with greasy applications.

Lime-water, on account of its astringent quality, is used as a wash in discharges from the ears and vulva, and is of most service when some active inflammation is still present. In the chronic stages of ear disease it is far inferior to the glycerine of tannic acid and other astringents.

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* It is far better to prevent cracked nipples, and is much easier than curing them. Immediately the child is removed from the breast the nipple should be carefully washed and dried. The nipples may be hardened by washing them some short time before delivery, and after each suckling, with a little brandy and water. A zinc shield worn constantly over the nipple is both healing and protective.

Dr. Joseph Bell recommends lime-liniment with cotton-wool to prevent small-pox pitting. Cotton-wool cut in proper shapes is dipped into the liniment, and applied so as carefully to cover the face and neck, leaving apertures for the eyes, nose, and mouth. No crevice must be allowed, and a large handkerchief must be tied over all, and the dressing allowed to remain on until convalescence.

Lime-water, probably owing to its alkalinity, is often useful as an injection in leucorrhœa.

Chalk makes a good tooth-powder, and is safer than powders with hard and angular particles which wear away the enamel, and lay bare the dentine.

Lime-water is occasionally used to lessen the discharge and to promote the healing of inflammatory and ulcerative diseases of the mouth.

Preparations of lime neutralize the acid in the stomach, and are antacids; but other remedies are mostly preferred. Salts of lime are useful in poisoning by oxalic acid.

It is not easy to indicate precisely the therapeutic value of lime-water in vomiting, but, in some forms of it, few remedies are more useful. It is generally useful in chronic vomiting; thus it often arrests the vomiting from chronic ulcer of the stomach. It should be mixed with milk, either in equal parts, or in the proportion of one of lime-water to four of milk; and if the vomiting is incessant, the patient should be fed only on this, in frequent small quantities of a tea or tablespoonful. Young children often eject much of their milk in lumpy masses, some passing into the intestines, and escaping with the motion, cause in their transit much wind and severe colic. Cows' milk is apt to induce this condition, as gastric juice coagulates it in lumps, while it generally coagulates human milk in fine flakes. Lime-water, by preventing this lumpy coagulation, checks this kind of vomiting generally at once; or, should it continue, the rejected milk is no longer curdled. In case of constipation, bicarbonate of soda should be substituted for lime-water. One-eighth of lime-water is generally sufficient, but this failing, a larger quantity, even equal parts of each, should be tried. Half a drachm to a drachm of bicarbonate of soda should be added to a pint of milk. These remedies both sometimes fail, and it may be necessary for a time to withhold milk, and to feed the child on sopped bread, water gruel, and chicken broth, or veal broth.

This vomiting occurs in early months of life, sometimes even during suckling. If the child is brought up "by hand" the milk should be sufficiently diluted, and during the first month with at least an equal quantity of water; indeed some authorities advise two parts of water to one of milk, the relative quantity of milk increasing as the child grows older. A child a month old may take a pint to a pint and a half. Dr. Meigs, of Philadelphia, recommends an excellent food for healthy children, and especially for those suffering from the kind of vomiting under consideration.—Soak a scruple of gelatine in a little cold water for a short time, and boil it in half a pint of water till it is dissolved, that is about ten or fifteen minutes. Just before finishing the boiling, add milk with some arrowroot made into paste with cold water, and afterwards some cream. The proportion of milk, cream, and arrowroot, depends on the age of the child. For an infant less than a month old he advises three to four ounces of milk, a teaspoonful of arrowroot, and half an ounce to an ounce of cream, to half a pint of gelatine-water; for older children the milk may be increased to a half or two-thirds. The gelatine and arrowroot prevent the lumpy coagulation of the milk, while the small quantity of arrowroot will not disorder the stomach. If even this food is rejected, then dilute the milk with three or even four parts of a very thin decoction of arrowroot, or try merely cream and water, one part of cream to three or four of water. This food consisting of milk, cream, arrowroot, and gelatine-water is very useful in diarrhœa.

Again, in young children suffering from chronic vomiting and diarrhœa, and consequent wasting, lime-water is often of great benefit, improving digestion, and apparently assimilation, and obviating that highly irritating state of the urine, which so commonly occasions intertrigo.

Solutions of these salts pass but slowly into the blood, on account of their low diffusion-power, hence the greater part pass through the intestines, and are ultimately voided with the fæces.

These substances neutralize any acid present in the intestines, and check the secretion from the mucous membrane; and sometimes by one means, and sometimes by both, act efficaciously in diarrhœa. Carbonate of lime and in a less degree lime-water, deservedly hold high place among remedies for diarrhœa in the later stages, when the irritant is got rid of. Common chalk mixture is useful in the diarrhœa depending on more serious causes, as ulceration in phthisis or typhoid fever; but in these graver cases other remedies are to be preferred.

It has been said that saccharated solution of lime does not confine the bowels, but, on the contrary, relieves constipation. It should not be taken on an empty stomach, lest it excite nausea.

In scrofula with glandular enlargements of the neck, in cases resembling tabes mesenterica, and chronic diarrhœa with weak digestion, Dr. Warburton Begbie extols chloride of calcium in ten to twenty-grain doses, given in milk after food and continued for a considerable time, its good effects, in many cases, not at once becoming apparent.

Lime-water is reputed to be useful in whooping-cough, and this may well be, owing to its astringency; for in certain forms of this disease, astringents, as alum and tannin, often effect a decided improvement.

Lime-water is a useful injection to destroy the thread-worms which infest the rectum. It has been also used as an injection in gleet.

From their low-diffusion power, a small quantity only of these substances passes into the blood; so small, probably, that it might well be doubted if they can in any way influence the organs remote from the intestines. But experience shows that lime-water or carbonate of lime is a valuable remedy in deficient nutrition, and in convalescence from serious disease, its good effects being most marked in children, in most stages of rickets, mal-nutrition, etc.

In some instances these good results are traceable to the action of the lime-salts on the mucous membrane of the intestines. The action of these salts, however, being very similar, although inferior, to that of phosphate of lime, we refer our readers to the section which treats of this salt. One point may be noticed here, confirmed by both theory and experience, that small will do as much good as large doses, since but little of these substances pass into the blood.

PHOSPHATE OF LIME.

This salt is of very great importance, both in health and in disease. It must be ranked among the most valuable and necessary foods, being probably as essential to proper growth and nutrition as the nitrogenous and fatty foods. Observations have abundantly proved its physiological importance. It gives solidity to the skeleton; hence if the quantity supplied to the body is small, or if the demand for it is greater than the supply, these solid structures suffer and lose their rigidity. Chossat produced softening of the bones of animals fed on food free from lime-salts; while, during pregnancy, much phosphate of lime being required for the ossification of the skeleton of the fœtus, it is found that the fractured bones of pregnant women unite slowly and imperfectly. Some experiments by Milne-Edwardes bear practically on this point, for he found that animals' bones intentionally fractured united more quickly when the animals were supplied with phosphate of lime.

The urine of pregnant women is said to be deficient in lime salts, but on this point the evidence is very discrepant.

The cardinal importance of this essential food to the soft and growing tissues is to promote cell growth and nutrition; and that this is a very feasible conclusion the following considerations tend to show:—

1. The presence of this salt throughout the body.

2. Its presence in much larger proportion in the intercellular fluid of the body than in the blood itself.

3. The fact that in herbivora the intercellular fluid is as rich in this salt as it is in carnivora, though the vegetable-feeders take so little of it with their food; hence it must be carefully retained in the intercellular fluid for some important purpose.

4. Schmidt's observations show that a certain quantity of phosphate is required to supply the first basis for the new tissues, even in the case of those organs which subsequently exhibit an excess of carbonate of lime, as the shells of animals; an observation showing that phosphate of lime is necessary to initiate growth, and, in this respect, is not interchangeable with the carbonate.

5. Wherever cell-growth is active, there is phosphate of lime in excess,—a statement holding good both with regard to

healthy and diseased growths; for this salt is found to prevail in disease associated with rapid formation.

With regard to the second and third points it must be borne in mind that phosphate of lime is soluble in acids, and as the intercellular fluid is acid, we should expect that the phosphate would accumulate in it.

Theoretically, it might be supposed that abundant data exist to enable us to forecast the occasions when to employ this salt remedially; it would be rightly assumed that in defective nutrition, or deficient cell-growth, the phosphate of lime would prove serviceable. Certain theoretical objections have indeed been urged against the employment of this salt. The fault it has been said is really not due to deficiency of lime, but inheres in the tissues, which fail to assimilate it; that, in cases of defective cell-growth and of mal-nutrition, the quantity of the phosphate in the urine is unusually great; and, consequently our efforts should be directed to remove the circumstances which check assimilation, for it is as little reasonable to treat diabetes with sugar, as a diabetes of phosphate of lime, with phosphate of lime. Some truth no doubt there is in these strictures, and too much attention cannot be paid to ensure the hygienic conditions favourable to assimilation, good air, abundant light, and sufficient exercise. The case before us is more analogous to anæmia than to diabetes; and we give iron with decided benefit in anæmia where this condition is due, not to want of iron in the food, but to the non-assimilation of it by the tissues. The efficacy of phosphates, however, must be decided by experience, and experience speaks abundantly in their favour. Beneké to whom on this subject we owe much of our knowledge, both physiological and therapeutical, has shown that phosphate of lime, is especially useful in those very diseases wherein it occurs in excess in the urine, as hectic, and chronic wasting disease.

This salt is of great use in the anæmia of young and rapidly growing persons, and women weakened by rapid child-bearing, prolonged suckling, or excessive menstruation. In checking chronic tubercular and non-tubercular diarrhœa, and other profuse discharges, as in leucorrhœa, chronic bronchitis, and large abscesses, it is a valuable remedy, effecting in these states both general and local improvement. Beneké speaks highly of its influence on scrofulous sores. It is useful also in caries of the bones.

This salt is apt to be deficient in town-dwelling women who improve under its administration; an increased quantity too, finds its way into the lime-lacking milk of a suckling mother, who with her child are thus simultaneously benefited.

Persons in broken health from prolonged town life or overwork, or who from other causes are languid, hipped, and incapable of much exertion, often derive much benefit from this medicine. In cases like this, a good formula is a grain of phosphate of lime, phosphate of iron, and carbonate of lime; but phosphate of lime will act admirably by itself. This medicine is useful in the chronic forms of phthisis, with little or no fever. It should be taken on the tongue either dry or mixed with a little milk.

No reasonable doubt can, I think, be entertained of the efficacy of phosphate of lime in many cases of rickets.

It has been sought to establish a connection in all cases between rickets and a deficient supply of lime; it is urged firstly, that rickets commonly occur during the first dentition, when much lime is required by the growing teeth, and, secondly, that rickets affect the children of mothers in just that state of ill health in which it has been established that the milk is deficient in lime. There may be much truth in these statements; but, as in many cases of rickets an excess of lime is found in the urine, the disease in such cases cannot be held to depend on a deficient supply of the salt, but must be due to other circumstances, with which, at present, we are only partially cognizant. In cases where the disease is dependent on deficiency of phosphate of lime, its administration is obviously all that is required.

In rickets, moreover, there is not merely deficient ossification of the bones, but unnatural growth and defective nutrition, both in the skeleton and in the other textures. The phosphate of lime appears to control this defective and perverse nutrition, and to induce healthy growth, so as not merely to favour the consolidation of the skeleton, but to improve the condition of the soft organs, and experience shows abundantly that many rickety cases are benefited more decidedly by lime salts than by any other single drug.

German authorities, who have studied this subject most attentively, consider that the fittest time to give this remedy is after the cessation of the active stages of the disease, that is, when the pains and tenderness of the bones have disappeared.

It is well to repeat a caution against the uselessness of administering this or other lime salts in large quantities, for, owing to their very low diffusion-power, very little passes into the blood. A grain or two grains, several times a day, is a sufficient dose. Given in excess, it hinders digestion.

Phosphate of lime in the stomach must be variously affected by the free acids, as lactic, hydrochloric and in a lesser degree, acetic acid, dissolve it.

Most of the phosphate passes into the intestines, where, if the salt is administered too long a time, it is liable to form concretions. Being unaffected by the pancreatic and biliary secretions, and but slightly soluble in the intestinal juice, most of the phosphate passes off with the stools.

Phosphate of lime is highly recommended in various forms of chronic diarrhœa, and especially in that of young children, to whom it may be given with carbonate of lime and lactate of iron. Whether the beneficial effects are due to its direct action on the mucous membrane, or take place after absorption, in the manner previously described, our present knowledge does not enable us to decide.

Being soluble in the acids of the gastric juice, and to some extent in solutions of common salt, its passage into the blood takes place probably in several ways. It has, however, been doubted whether any portion, if uncombined with food, passes into the blood, since no augmentation of this salt is met with in the urine; nay, in some cases it seems even lessened. The observations on this point are, perhaps, too scant to set the question at rest.

Much phosphate is taken either in combination with the food, or so intimately blended with it that it is well-nigh impossible to separate it from the tissue-forming substances, and so it finds ready entrance into the blood, with the digested materials constituting the chief, and in ordinary cases the only, source of phosphate of lime for the supply of the system. That so alkaline a fluid as the blood is capable of dissolving the phosphate, is explained by its solubility in solutions containing free carbonic acid or common salt.

HYPOPHOSPHITE OF LIME. HYPOPHOSPHITE OF SODA.

Dr. Churchill recommends these drugs in phthisis, and his statements regarding their action have for the most part been upheld by Dr. Thorowgood and some other observers.

Dr. Churchill commences with a grain and increases the dose to six or seven grains a day, giving it in the form of syrup or pill. Dr. Thorowgood gives a grain three times a day in the form of syrup. In too large doses it may produce weakness, sleepiness, headache, giddiness, noises in the ears, loss of appetite, colic, diarrhœa, and even bleeding from the nose and lungs. Dr. Churchill administers these agents uncombined and cautions against giving them with iron, cod-liver oil, or stimulants. It is said that the hypophosphites increase appetite and digestion; promote the formation of the blood; lessen cough and expectoration; relieve pain in the side and diarrhœa; and often effect a cure. They are said to be more useful in the first than in the second stage; and in the second than in the third stage; and when only one lung is affected—a statement sufficiently obvious and applicable indeed to every remedy. Thorowgood says they are more successful with young than with old people. These remedies are also recommended in nervous and general debility; teething; spermatorrhœa; chlorosis; and anæmia.

CHLORIDE OF POTASSIUM, CHLORIDE OF SODIUM, CHLORIDE OF AMMONIUM.

These substances, having many chemical and therapeutic qualities in common, have been grouped together; but the remarks in this section refer mainly to chloride of ammonium.

These salts are freely soluble, and possess high diffusion-power. The saltish taste common to them all, is, in the case of chloride of ammonium, somewhat disagreeable, and constitutes one of the objections to its use.

These chlorides considerably increase the secretion from the mucous membrane; and may indeed even excite catarrh. This is notably the case with chloride of ammonium, which is consequently employed chiefly when it is proposed to influence the mucous membrane. How do these chlorides promote the formation of mucus? Let us take the instance of common salt. Chloride of sodium is a large constitutent of mucus, and salt when taken into the system, probably promotes the production of those secretions of which it forms a large part. It is, indeed, a food to the mucous membranes. This suggestive hypothesis may possibly apply in the case of other members of this group. These substances, and especially sal ammoniac, are sometimes employed in catarrhal conditions of the intestines, and to prevent the formation of that thick tenacious mucus which forms a convenient nidus for various worms infesting this canal.

Owing to their high diffusion-power, these salts pass rapidly into the blood, and so travel along the intestines too small a distance to act as purgatives; hence, unless administered in considerable quantity, they exert very little influence on the character of the motions.

Common salt is used to produce sickness, or to promote the action of other emetics. Given in poisoning by nitrate of silver it effects a double decomposition, precipitating the silver as the harmless insoluble chloride.

Chloride of ammonium is often given with considerable success in chronic catarrhs of the bronchial and urinary mucous membrane. It is indicated in chronic bronchitis when the secretion is thick and abundant, and it may be applied topically to the morbid mucous membrane by the atomizer.

The same remedy has been lauded for whooping-cough. It is said to be frequently successful in removing the pain of facial neuralgia "of rheumatic character." It should be given in half-drachm doses, and if, says Sir T. Watson, four doses fail to give relief, the drug may be considered unsuitable for the case. I have many times found it useful in facial neuralgia in full doses several times a day. Dr. Anstie speaks well of it in megraine, clavus, myalgia, intercostal and hepatic neuralgia, and in mild forms of sciatica.

Many doctors employ this salt in all forms of neuralgia; and I have heard some eminently practical men go so far as to assert that in this painful affection they require no new remedy, since chloride of ammonium so rarely fails. Mr. Ashburton Thompson holds this remedy only second to phosphorus.

Chloride of ammonium is given with advantage in headaches due to menorrhagia, amenorrhœa, &c. (Megraine).

Common salt sometimes arrests hæmoptysis. Half a teaspoonful should be taken undissolved, and be repeated occasionally till it excites nausea.

Dr. Parkes states that "muriate of ammonia is not oxidised, but passes out unchanged by the urine." "According to Böcker, it increases (in health) all the constituents of the urine, except the uric acid, which it slightly diminishes. The mean daily increase of the urea in these experiments was 4·793 grammes, or 74 grains, an amount which indicates a vast augmentation of metamorphosis or of elimination. The volatile salts and extractives were increased by no less than 18·959 grammes, or 292 grains, which was, no doubt, partly owing to the presence of the volatile chloride of ammonium." (Parkes *on Urine*).

Group containing SULPHATE OF POTASH, SULPHATE OF SODA, SULPHATE OF MAGNESIA, PHOSPHATE OF SODA, TARTRATE OF POTASH, BITARTRATE OF POTASH, TARTRATE OF POTASH AND SODA.

We have adopted this grouping, with slight modification, from Buchheim's excellent work on therapeutics.

With the exception of the sulphate and bitartrate of potash, these substances are freely soluble in water.

The sulphates have a very disagreeable bitter taste, which in the phosphate of soda is but slight, and in the tartrates is absent.

They are all purgative, producing watery evacuations, which is probably due to their very low diffusion-power.

They have little or no affinity for animal textures, nor much attraction for water, whence they effect few changes in the organic constituents of the body.

While they all act as purgatives, producing watery evacuations they excite very little irritation in the mucous membrane.

How do they produce their purgative effect?

Purgatives may act in one of two ways, or in both combined.

Some purge by increasing the moisture of the intestines, and so facilitating the passage of the contents along the canal; others act by increasing the peristaltic action of the intestines, so that the contents are urged more rapidly towards the rectum; whilst most purgatives combine both modes, although one action usually predominates.

The watery character of the motions shows without doubt that, in part at least, these drugs purge by augmenting the moisture of the contents of the intestines,—an augmentation effected in three ways; by causing water to flow from the blood into the intestines; by exciting the mucous glands of this tract to increased secretion; or by effecting the retention of the water already present in the intestines. From Buchheim's careful observations it appears that these salts purge solely in virtue of their power to retain in the intestines the water existing there, producing no flow of fluid from the blood, no increased secretion from the mucous glands, shewn by the fact that, after purgation with these medicines, no albuminous substances are found in the fæces. Other observers, however, maintain that these salts do cause a flow of water from the blood into the intestines, for when a solution of sulphate of magnesia is put into a knuckle of intestine secured at both ends, it is found that after some hours the contents of the bag are increased.

How do they influence the retention of the water existing in the intestines?

These salts, as we have said, possess a very low diffusion-power; they pass slowly, and hardly through animal membranes; that is, they pass from the intestines to the blood with difficulty, being for a long time retained in the canal. As, however, they hold with considerable tenacity both the water of solution and that encountered in their course through the body, this water is prevented from passing from the stomach and intestines to the blood. It is not generally held that the members of this group act purgatively by increasing markedly the peristaltic contraction of the intestines, since they produce neither much pain nor griping. It appears then that they are mere expellents from the intestines, not eliminators of effete material from the blood, although by emptying the intestinal canal they prevent its contamination by the products of fæcal decomposition.

An excellent way to administer some of these salts is in the form of Pullna, Friedrichshall, or Hunyadi Janos water, in doses varying from a wine-glassful to half a tumblerful or more. Usually one dose before breakfast is sufficient; if not, a second, and even a third dose may be taken in the course of the day. It is advisable to mix the natural water with a third or an equal quantity of boiling water; for when taken cold it is sometimes liable to "lie heavy on the stomach." Usually a wine-glassful of one of these waters, with an equal quantity of hot water, is sufficient to open the bowels without much griping or pain.

A wine-glassful of Friedrichshall water in a breakfast-cupful of hot water is very useful in bilious sick headache. The best time is before breakfast, though it is useful at any time. It stays the nausea and soon relieves the headache, sometimes without purging. The taste of this mixture is not very disagreeable. Pullna or Friedrichshall water mixed with milk is a good purgative for children, the milk disguising the bitterness of the natural waters.

An orange or two eaten before breakfast is a pleasant and often effectual way of overcoming moderate habitual constipation; and sometimes indeed this plan overcomes the more obstinate forms. A glass of cold water before, and an orange soon after breakfast, are another good means of obviating constipation, and if oranges before breakfast disagree they should be taken soon after it.

There are many persons, especially busy, worried men, whose comfort and well being seem to depend on an efficient daily evacuation of the bowels. If they pass a day without relief of the bowels or if the defecation is delayed to the after part of the day, they suffer from mental dulness and inactivity, a kind of fogginess, with much irritability, and perhaps a dull "stupid" headache. They are quite conscious of their irritability, but cannot well control it. Directly the bowels act freely these symptoms vanish at once, the head clears, the spirits revive, the ill temper disappears, they recover their full mental capacity, and in a short time longer, perhaps half an hour or an hour, the headache disappears. With many such patients the constipation is not obstinate, but they pass daily, a hardened dry evacuation insufficient to give comfort. Porridge, brown bread and exercise is generally sufficient to overcome the constipation. If not, then fruit before or after breakfast should be tried, and this failing, the natural purgative waters will often prove useful.

Carlsbad waters are eminently useful in many abdominal diseases. The imported waters are especially efficacious when a dietary is adopted similar to that enjoined at Carlsbad. The water should be warmed to about 100° to 110°, and the patient must drink three to six tumblerfuls before breakfast, prolonging the drinking over an hour or more, and if possible whilst taking exercise in the open air. Dr. Stephen Ward says, "even when first taken and in moderate quantity they usually cause pulpy slimy stools of dark colour and offensive odour. The stools are generally frequently repeated and the patient is astonished at the quantity that sometimes comes away, but in many persons no very evident symptoms beyond the purgative action attend the drinking of the waters." I have rarely seen them purge, because, perhaps, I have chiefly used them in obstinate constipation. The quantity to be taken depends on their effects. It is better to begin with three tumblerfuls and gradually increase the quantity to four, five, or six according to the action. This treatment must be continued three weeks or a month. It often induces some weakness. It reduces stoutness and sometimes even makes a patient very thin. But if it produce much depression or excites nervous symptoms, a smaller quantity must be taken and the course must be limited to a fortnight or three weeks. The good effects are sometimes not apparent till a week or so after the course. The diet at Carlsbad is extremely simple: "Fat, butter, cream, pastry, cheese, rich meats, as pork, goose, sausages, salmon, mackerel, herrings, anchovies, entrées, and other dishes, seasoned with spices, pepper, onions, garlic, &c., are to be avoided. Dressed salads, cucumber, and uncooked fruit generally are objected to as being indigestible and likely to cause flatulence and irritation of the bowels. The use of spirits is absolutely forbidden, and the wine of the country or the lighter French wines are permitted only sparingly and in cases especially requiring a certain amount of stimulus. The breakfast, which is usually taken about an hour after drinking the last cup of water, consists merely of weak tea or coffee, with milk and a little sugar, and small well baked rolls or second day's bread; meat, fish, or eggs being excluded, except for the very delicate. The dinner which takes place at one, consists but of three courses; soup, free from grease and spices, and thickened with barley, rice, or vermicelli; meat, as beef, mutton, lamb, poultry, or game, with well boiled fresh vegetables; and a light simple pudding or a compôte of stewed fruit; a cup of coffee may be taken in the afternoon; a light supper is taken at eight o'clock; and smoking in moderation is not objected to." (Dr. Stephen *Ward).*

This treatment is extremely useful in obstinate habitual constipation and by its means I have cured some of the most rebellious cases. In such instances it may not relieve the bowels, for some days, indeed even a week may pass without relief; in other cases it at once produces one or two soft copious natural evacuations, and on discontinuing the water the bowels act daily. After some months, however, a recourse to the waters may again become necessary owing generally to some fault in the patient's habits. In cases of simple obstinate constipation, it is not necessary to enforce very strictly the rigorous Carlsbad regimen just described.

Again, in cases like the following, Carlsbad waters are very useful:—a middle-aged woman accustomed to eat and drink somewhat too freely suffers from acidity, much flatulence, constipation with attacks of pain at the epigastrium, or over the liver, or between the shoulders, the conjunctiva becoming rather jaundiced and the complexion sallow. In a case like this, a well regulated diet greatly assists the action of the waters. This treatment is also useful in gall stones and gout. Patients sometimes say they have tried Carlsbad waters without good results, when they have simply taken Carlsbad salts dissolved in a small quantity of water. In such a form the Glauber salts purge, but fail to yield the same excellent results, as when given largely diluted with water; I have no doubt that the large bulk of water plays a prominent part in the therapeutic effects.

The medicines now under consideration are not to be indiscriminately used. Bitartrate of potash is employed in both general and local dropsies, but more frequently in general dropsies, and is especially used as a hydragogue cathartic in Bright's disease, to prevent dangerous watery accumulation in the cellular tissues, or in the cavities containing the heart and lungs. With the water, it draws off also the effete and poisonous matters which in this disease are retained in the blood. Being mere evacuants of the intestines, these remedies might be thought ineffectual to withdraw either water or urea from the system; but a little reflection will show us this is not the case.

During digestion, a considerable quantity of fluid is poured into the intestines by the stomach, the liver, and the pancreas. Now, if the blood contains poisonous matters, some portion of the poison must contaminate the fluids secreted by these organs. By retaining in the canal much of this fluid, until it undergoes expulsion through the anus, these medicines diminish the quantity of fluid of the body, removing simultaneously some of the poisonous matters accumulated in it. So far, theory; and experience, we find, supports it. The concurrent testimony of practical men bears witness to the fact that free purging with bitartrate of potash, or by other members of this group, lessens the fluid in the cellular tissue and cavities of the body, while it often simultaneously removes coma, convulsions, and other symptoms due to the poisoned blood. It is a treatment that must be adopted with caution; for it must be borne in mind that free purging is weakening.

A brisk purgative frequently promotes free and abundant secretion from the kidneys, either when healthy or diseased; and herein we have, perhaps, further elucidation of the good effects of these remedies in Bright's disease.

Some member of this group, generally either sulphate of magnesia or phosphate of soda, is often given as an intestinal evacuant in fever; hence they are reputed to be febrifuge. But their action is due simply to the unloading of the bowels, since it is well known that constipation augments the preternatural fever heat.

For fever patients, Dr. Armstrong strongly recommended free purgation to the extent of several evacuations daily, during the first few days, before exhaustion sets in. This treatment still finds just favour with many practical authorities, although it is not approved by Dr. Graves. It is considered that free purgation in scarlet fever prevents severe sorethroat, glandular swellings, discharges from the nose and ears, with many other disagreeable sequelæ.

In measles purgatives must be given with caution, the bowels being generally irritable, and diarrhœa often present.

The salts of this group most frequently employed are the bitartrate of potash, sulphate of magnesia, and phosphate of soda. This phosphate, well-nigh tasteless, may be given to children unsuspected in a little broth.

The sulphates are common ingredients in purgative natural waters, and in this form are frequently taken in small doses in constipation or torpid liver. In obstinate constipation a draught should be taken once or twice daily. Small doses, often repeated, act with greater certainty than a single large dose; hence when the bowels are tightly locked up, having resisted the action of a full dose of Epsom salt, it is a good practice to give the same remedy in small and often-repeated quantities.

It should be mentioned that the administration of sulphate of potash must be conducted with some caution, for, although usually a safe and mild purgative, it has proved in some cases poisonous.

On account of the low diffusion-power of these salts, very little passes into the blood, the greater part, especially when they purge, passing from the system with the fæces. Small doses, if they tarry long in the intestines, ultimately pass into the blood, and are separated by the kidneys. They are reputed to act as diuretics. The tartrates of this group are highly esteemed as excellent diuretics in Bright's disease, and are often employed in doses short of purging. The tartrates and bitartrates are converted into carbonates, partly in the intestines, and partly in the blood. They thus lessen the acidity of the urine, or even render it alkaline. Except in the case of phosphate of soda, the action of these salts on the constituents of the urine, either in health or disease, has not yet been worked out.

As the action of phosphate of soda and of phosphoric acid appears to be nearly identical, we will speak of them conjointly; and for the account of their action we must be indebted to Dr. Parkes's classical work on the urine.

If Böcker's experiments on his own person are to be accepted as conclusive, the effects of these substances are highly singular. He found that phosphoric acid always carried potash out with it, and that phosphate of soda changed its base, taking potash in its place.

Phosphate of soda, therefore, greatly lessens the quantity of potash in the body, and the acid would greatly diminish the amount of alkali in the blood, but for the singular fact observed by Böcker, that, while eliminating potash, both phosphoric acid and phosphate of soda caused a retention of chloride of sodium in the blood, to such a degree as actually to heighten the alkalinity of the body.

The effect of phosphate of soda is to lessen the urea in the urine, partly by the retarding effect it exercises on digestion, so limiting the supply of food to the system, and consequently diminishing the quantity of urea separated by the kidneys. But it appears that this diminution is due in part to lessened metaexpulsion through the anus, these medicines diminish the quantity of fluid of the body, removing simultaneously some of the poisonous matters accumulated in it. So far, theory; and experience, we find, supports it. The concurrent testimony of practical men bears witness to the fact that free purging with bitartrate of potash, or by other members of this group, lessens the fluid in the cellular tissue and cavities of the body, while it often simultaneously removes coma, convulsions, and other symptoms due to the poisoned blood. It is a treatment that must be adopted with caution; for it must be borne in mind that free purging is weakening.

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The effect of phosphate of soda is to lessen the urea in the urine, partly by the retarding effect it exercises on digestion, so limiting the supply of food to the system, and consequently diminishing the quantity of urea separated by the kidneys. But it appears that this diminution is due in part to lessened metamorphosis of tissue, since, even when the salt is given on an empty stomach, the urea is still diminished. Phosphoric acid neither lessens the urea, nor affects the digestion.

For further information regarding the influence of these two medicines on the urine, we must refer our readers to Dr. Parkes's work.

NITRATE OF POTASH, NITRATE OF SODA.

These salts possess a very high diffusion-power, and are freely soluble in water. They lower the temperature of water, an effect very considerably increased if sal ammoniac is mixed with the nitre. This combination of salts used to be applied to the skin as a refrigerator, though now it is rarely so employed, and is to be especially avoided if the skin is broken, as solutions of the nitrate are very irritating to wounds. Ice is in every way a better refrigerator.

The inhalation of the fumes of burnt nitre-paper will sometimes avert the paroxysm of asthma. According to Dr. Hyde Salter this treatment is most effectual in pure uncomplicated asthma. He points out that the paper must not imbibe too much nor too little nitre. If the bibulous paper is too thin, it absorbs insufficient nitre; if two thick, it takes up excess of nitre, and the fumes are too carbonaceous, the paper burning too fast, with a sudden explosive flame. There should be no brown smoke, but clear white fumes. Red blotting paper of moderate thickness and loose texture is best. Dr. Salter gives the following directions for the manufacture of nitre-paper:—Dissolve four ounces of nitre in half a pint of boiling water; pour the liquid into a small waiter, and soak the paper, then drain and dry it. Cut it into pieces four inches square, and when required, burn one or two of these pieces, or a piece may be burnt nightly in the bedroom. The prepared paper must be kept in a dry place. In the Pharmacopœia of the throat hospital, Dr. Morell Mackenzie gives the preparation of three papers of different strength; one made from a solution containing sixty grains, another forty grains, and the third thirty grains of nitre to an ounce of water. He directs the paper to be cut into pieces three inches long and half an inch broad, and one to six of these pieces to be used successively at each inhalation. The paper is burned in a jar and the fumes inhaled by taking deep inspirations from the fuming vessel. Various substances may be added to the solution and appear in some instances to heighten the effect of the nitre, such as compound tincture of benzoin, spirits of camphor, oil of cassia, and tincture of sumbul. It is a singular circumstance, affording a marked example of the "caprice" of asthma, that a paper prepared with nitre only will relieve one patient, yet will utterly fail to relieve another, although a nitre paper prepared in a different manner may be quite successful. It must be borne in mind, therefore, that although one kind of nitre paper has failed, it does not necessarily follow that another sort of nitre-paper will also fail. Sometimes a thin paper fails where a thick one succeeds, or *vice versâ*. It appears indeed that very slight differences in the mode of manufacture influence the therapeutic effects. Many quack papers said to contain other substances besides nitre, or besides nitre and chlorate of potash, often succeed admirably.

A considerable recent experience leads me to conclude that these papers would prove much more relieving if somewhat differently prepared, and if pieces were burned sufficiently large to fill the room with fumes. The most efficacious paper is made by dipping ordinary white blotting paper in a boiling saturated solution of nitrate of potash and chlorate of potash. Paper thus prepared burns with a flame. A large piece, the size of course depending on the dimension of the room, often succeeds when other prepared papers fail. A piece ten inches square, and sometimes two or three pieces are required. When ordinary papers have failed, I have recently used in some cases with advantage a pastile compounded of two parts of nitre, one part of chlorate of potash, with two parts of lycopodium powder. My friend Mr. William Murrell is using with much success a thick paper soaked in a boiling saturated solution of nitre and chlorate of potash. This thick paper, make by the adhesion of six sheets during crystallization, contains, when dry, twice its own weight of salt; and a piece of paper six inches square, takes up nearly half an ounce of the mixed salt. Certain cases require a greater quantity of nitre smoke than others. I am convinced that the reason why papers appear in so many cases to fail, is that they are not adequately impregnated with nitre, and are consumed too sparingly.

The crystals of nitre have a cooling, saline taste, and in acute inflammation of the throat are sometimes sucked, but other remedies are preferable.

These salts it is thought, while undergoing solution in the stomach, will absorb heat, and cool this organ; but to be of any service in this way a sufficient quantity cannot be taken with safety. Ice or iced water is far more effectual.

In large doses the nitrates inflame the stomach. Even when taken for some time in moderate quantities, they considerably disorder digestion, producing nausea, vomiting and a coated tongue; consequently, their action must be carefully watched.

How the nitrates excite inflammation of the skin or stomach is not yet explained; for if these tissues are soaked in solutions of these salts, no other change takes place than occurs from the action of simple water.

From their high diffusion-power these salts speedily enter the circulation. Unless indeed large quantities are taken, they pass but a short way along the intestines, and, therefore, do not purge, and indeed, so far as we know at present, exert little or no direct influence on either the small or large intestines.

Much conjecture has been hazarded regarding the action of the nitrates on the blood. It is well known that they prevent the coagulation of the fibrin in blood withdrawn from the body, or, when coagulated, dissolve it. Scherer, however, asserts that they will not dissolve the fibrin of inflammatory blood. These facts have led to the supposition that the nitrates may possess a like influence over fibrin in the circulation, and that they are indicated when this substance is in excesss, as in inflammations and acute rheumatism. There is no proof, however, that the nitrates possess any such power; and indeed, unless employed in considerable quantities, they exert very little influence upon fibrin out of the body. Hence it cannot be expected that after its dilution with the fluids of the circulation, harmless doses can in any way influence the fibrin of the blood. But, indeed, this notion is no longer tenable; for it has been ascertained that blood withdrawn from the body, both before and after the administration of nitrate of potash, contains in each case the same quantity of fibrin.

These salts are considered to be highly useful in acute rheumatism and are supposed to protect the valves of the heart, or to restore them to their natural state when damaged by rheumatism—a supposition founded on a misapprehension of the morbid processes which lead to valvular contraction and incompetency. These structural changes, it was imagined, resulted from the deposition of fibrin on the surface of the valves, and the subsequent contraction of this substance rendered them shrunken and inefficient, the truth being that these changes in the valves are owing to lymph formed in their own substance. Occasionally, it is true, fibrin is deposited on thickened and roughened valves, but even this, as has just been pointed out, these salts, can neither prevent nor remove.

While it must be admitted that these salts do not act in the way supposed, many high authorities consider that nitre mitigates and shortens an attack of rheumatism. The advocates of nitre administer it in large doses, freely diluted in water, giving as much as half an ounce to an ounce of the salt in the course of the day in lemonade or barley-water agreeably sweetened. The urine, it is said, becomes very abundant, when the fever declines, and the pains abate. At present there are no observations sufficiently exact to determine this point.

The same discrepancies of opinion prevail regarding the influence of the nitrates on acute inflammation.

Large doses produce pains in the stomach, with vomiting and diarrhœa, great weakness, faintings, loss of consciousness, and death. The same symptoms are witnessed in a minor degree, when less immoderate quantities are used. The patient becomes languid, disinclined to exert either body or mind, and the pulse is feeble and slow.

These salts readily pass from the body through the kidneys with the urine, and in their passage may irritate and inflame the urinary organs, and in large doses may even produce bloody urine.

Nitrate of potash has been recommended in the incontinence of urine of children.

The nitrates appear to increase temporarily the water and urea of the urine; ultimately, however, these both fall below their natural amount; hence the nitrates are mere eliminators of these substances.

In some quarters they enjoy a very high reputation as diuretics, and in certain cases appear to be of considerable service. Their diuretic action is well displayed in lumbago and chronic rheumatism, accompanied by scanty high coloured urine which becomes turbid on cooling. Ten grains of the salt dissolved in water, taken hourly or every two hours, in most cases, will soon increase the urine, rendering it clear and limpid, when the rheumatic pains generally decline.

CHLORATE OF POTASH.

In many of its chemical properties Chlorate of Potash corresponds to the preceding group of nitrates; like them endowed with a high diffusion-power, it differs in its sparing solubility.

A solution of the chlorate used as a wash is said to clean and stimulate foul ulcers; but other remedies are more effective.

This salt appears to increase the flow of the saliva, and, according to Hutchinson and others, to produce ulceration of the mucous membrane of the mouth. It is largely used in various affections of the mouth, and is of signal service in mercurial and simple salivation, in ulcerative stomatitis and aphthæ. It is particularly useful in ulceration of the edges of the gums, generally limited to one side of the mouth, affecting both the upper and lower jaws, also that part of the tongue and cheeks coming in contact with the ulcerated gums. Although not at all dangerous, it is often a very obstinate complaint, especially with adults, though children are most prone to it. The influence of the chlorate on this form of ulceration is almost magical; in one or two days it cleans the dirty looking ulceration, and heals it in a day or two more. It is said to cure follicular and phagedenic ulceration like a charm. Dr. Lloyd Roberts says, that chlorate of potash may be taken internally, and used as a lotion for the teasing dryness of the mucous membrane of the throat left after diphtheria and scarlatina.

Dr. Leonard Sedgewick speaks highly of chlorate of potash in catarrh; he says, it quickly relieves stuffing of the nose, rawness of the throat, and thickness of voice. Taken early and frequently, it will stop many a cold. Eight or ten lozenges should be sucked in the twenty-four hours.

Some assert that the action of chlorate of potash is simply local, and that its good effects are all due to its topical application.

Chlorate of soda is more soluble than chlorate of potash, and is said to be equally serviceable.

Chlorate of potash seems to produce but little effect on the stomach unless taken in considerable quantities, when, like the nitrates, it inflames the mucous membrane, and produces both vomiting and diarrhœa. It is not employed in diseases of the stomach.

Owing to its high diffusion-power it passes readily into the blood, but owing to its slight solubility, a large quantity of this salt cannot find its way quickly into this fluid.

Dr. Kent Spender recommends large doses of it in phthisis, and lets the patient drink *ad libitum*, a concentrated solution. This treatment, he says, checks diarrhœa and prolongs life. He recommends also, large doses in the stomatitis of children.

As this salt easily parts with its oxygen, it was at one time supposed, that by yielding up this element to the blood and tissues, it might promote oxidation; but careful observations have conclusively proved the erroneousness of this view, as the salt can be obtained unaltered from the urine.

It has been recommended in facial neuralgia.

Its influence, if any, on the organs of the body is unknown.

ALUM, DRIED ALUM, ACETATE OF ALUMINA.

THESE salts act mainly as astringents, in virtue, it is supposed, of their capacity to unite with albumen, and coagulate it.

They produce no effect on the entire skin; but when applied to sores, they coagulate the albumen of the pus, mucus, or of the tissues themselves, thus coating the sore with an impermeable layer, and protecting it from the action of the air. Like the salts of many other metals, alum, may be used to form this protective coating. These agents have a further action than that just described; for, as just stated, they act as astringents by combining with and condensing the tissues. The topical application of alum contracts the blood-vessels and lessens the supply of blood to a sore. By constringing the blood-vessels, and by condensing the tissues themselves, the members of this group will depress the vital action of a sore, and so check the secretion of mucus or pus. For this purpose al dry, or in solution, to relaxed and abundantly secr

In such cases other astringents generally succeed

Alum solutions may be applied to free-weeping surfaces, to check profuse discharge, and to bring into a condition suited for other remedies. Like ot gents, alum, is generally insufficient to heal eczema.

Owing to their property of condensing tissues and co albumen, these substances may be used to control th forms of bleeding, and alum in an emergency has the a of being almost always at hand. In severe hæmorrhag treatment is of course required, but to check the bleedin gums, of piles, leech-bites or slight cuts, alum dusted affected part, first wiping it dry, or applied in pretty solution, is generally sufficient. In epistaxis, alum may jected into the nose, or may be snuffed up as the dried pow

In strong solutions (six grains to the ounce) alum has recommended, though it is little used, in prolapsed an uterus.

In vulvitis of children, few remedies can be compar alum, used in the strength of sixty grains to a pint of and frequently applied, every hour or oftener, by the hel syringe, to the secreting surface, first washing away th with warm water and then applying between the parts a p lint soaked in the lotion. Although generally successfu treatment sometimes fails to check this troublesome com even when it cannot be traced to any irritation, as worm stipation, or teething. In some cases, the discharge l coming from the surface of the vulvæ, is poured out fro lining membrane of the vagina, when it is necessary t care to pass the injection up the vagina. Want of attent this fact explains the occasional failure of treatment and ent obstinacy of the case. The solution just recommende sometimes prove too strong, increasing both the inflam and the discharge, when of course its strength must be re

Similar solutions are useful in chronic otorrhœa, bu is far inferior to glycerine of tannic acid.

A solution of alum, of the strength of eight grains ounce of water, is an excellent solution in simple, and cially in purulent ophthalmia of children. The conju must be well washed with it every quarter or half ho ess depends on the frequency of the application. Simple r, as frequently applied, is a useful, although inferior substi-

'ew substances are so useful as alum in certain diseases of mouth. Thus in simple ulcerative stomatitis,—that form ich, beginning at the edge of the gums and never spreading beyond, is often limited or most marked over one half of the w,—gives way in a few days to dried alum applied with the ger many times a day. It is not merely astringent; ut, from its attraction for water (which it has lost by being eated), it is also slightly escharotic, and gently stimulating to he indolent tissues. Ulcers like these, produce ulceration by contact with the contiguous mucous membrane of the tongue or cheek.

Aphthous ulcers, showing but little disposition to heal, or indeed tending to spread, may be touched with dried alum a few times a day with the best effect. Usually no such application is required, and chlorate of potash, and perhaps a purgative, are all that is necessary. Other forms of ulceration may be treated in the same way. Alum is recommended to be applied to the throat either dry or in solution in simple or scarlatinal sore throat, in tonsillitis, and even diphtheria. Alum being now little used in any of these cases, its advocates, perhaps, exaggerated its good effects.

It is asserted that ten grains of powdered alum placed dry on the tongue will sometimes arrest a paroxysm of asthma.

Gargles of alum are more useful in chronic inflammations of the throat, when the mucous membrane is relaxed and covered with a grey mucus or with pus, but although alum is highly useful, the glycerine of tannin is a surer and less disagreeable application.

Many cases of chronic ozœna speedily yield to a solution of alum, a drachm to the pint, applied by an irrigating tube. About a foot above the patient's head is a jug containing the solution, and in this jug, one end of an elastic tube is placed. The solution is then sucked or manipulated into the tube, when the free end is placed in one nostril, and the ala of the nose pressed on it to secure it in position. Here we have a syphon, and the fluid runs from the vessel through the tube, up one nostril, round the septum, and down the other nostril washing the sinuosities of the nasal membrane most thoroughly. The head is bent a little forward, and the mouth must be kept open, and if properly managed, none of the solution escapes by the mouth, or runs down the throat. Even when this irrigation fails to eradicate the disease, it checks the discharge, and removes the offensive smell depending on decomposing matters. Some prefer acetate of alumina as more efficient in correcting the fœtor than simple alum. If the fœtor persists, the application should be used twice a day, or oftener. If the fœtor is very great, a weak solution of permanganate of potash or carbolic acid may be used. A wash of a solution of glycerine of tannin in water is often useful.

A strong solution of alum is sometimes useful in pruritus vulvæ.

Ten grains of alum to the ounce of water is used in the form of spray for chronic coughs and hoarseness.

Alum behaves in the stomach, as on the denuded skin; it coagulates the albumen, and constringes the mucous membrane; and it hinders digestion by each of these processes. It will often check bleeding from the stomach, but it is inferior to other astringents. It sometimes controls vomiting. In six to ten grain doses it sometimes checks obstinate forms of vomiting, occurring in phthisical patients, especially that form excited by coughing.

Dr. Meigs speaks very highly of alum emetics for children and he prefers it to other emetics in croup. He gives a drachm in honey or syrup every ten or fifteen minutes till the child vomits, but a second dose is not generally required. Alum, he says, does not weaken and does not lose its effects so soon as antimony or ipecacuanha. Dr. Meigs strongly advocates the employment of emetics in true croup, and thinks that many lives might be saved were they more commonly used and repeated oftener. In severe cases he produces vomiting three or four times a day or even oftener. This treatment must be begun early.

Alum checks secretion from the mucous membrane of the intestines and constipates by rendering the contents of the canal more compact and more difficult of propulsion. Alum is sometimes used in both acute and chronic diarrhœa, and it has proved useful in the diarrhœa of typhoid fever and of dysentery.

It is uncertain how far the members of this group pass down the intestinal canal, but probably not far without being decomposed and rendered inert. Alum, extolled by many high authorities in lead colic, is said to remove the spasm and the pain, and at the same time to unload the bowels more speedily and certainly than other remedies. It is given in considerable quantities, as much as ten grains every hour. The few trials I have given this treatment have not been rewarded with success.

The long-continued administration of these substances produces loss of appetite, constipation, and at last chronic catarrh of the stomach and intestines. Large doses cause gastro-enteritis at once with its usual symptoms.

When the acute stage of whooping-cough is over, alum is an excellent remedy, and when there is no fever nor inflammation of the lungs, nor any irritation of the teeth. In fact, it is useful only in uncomplicated cases; but in these, few remedies give more satisfactory results. It speedily reduces the violence and frequency of the paroxysms, often indeed at once lessening their recurrence one half, and, in fact it often straightway soon cures.

Alum checks the troublesome vomiting so often met with in whooping-cough, and much improves the appetite, effects observed sometimes even before the cough undergoes any diminution. Constipation rarely happens.

Alum may control whooping-cough simply by its astringent action on the throat, and in support of this conjecture, other astringent substances, as tannin, &c., are likewise useful (see Tannin), even when applied to the throat only. Alum itself acts best when mixed with some tenacious fluid, as gum, glycerine, or honey, so that the solution is made to cling for some time about the fauces.

The alum should be given in doses varying from two to six grains every three hours, or it may be given hourly in corresponding doses. Alum is generally beneficial in the paroxysmal cough, which may continue a long time after the characteristic whoop has disappeared, and in other coughs having the same spasmodic character.

It is unknown how much of these substances is absorbed by the intestines, and conveyed into the blood, but probably not a large quantity. The chief part escapes by the fæces, which the alum is said to make firmer and odourless.

It is doubtful if alum has much effect as a remote astringent to check bleeding from the lungs, uterus, kidneys, etc., and to check profuse sweating and discharges. Alum injections, one drachm to a pint, employed in the manner directed for the injection of carbonate of soda (See Potash Group), are very useful to check leucorrheal discharges. The alum solution constringes the parts, and sometimes causes severe cramp-like pains in the belly.

PREPARATIONS OF IRON.

Iron is a constant and necessary constituent of the body, and must be regarded as an important food.

None of the preparations of this metal applied to the skin produce any change in it. Several of the soluble salts combine with albumen on raw surfaces, sores, and mucous membrane, condensing the tissues, and constringing the blood-vessels; and besides this astringent action, they at the same time act as stimulants or irritants according to the strength of the application or the condition of the sore.

The organic salts are less astringent and stimulating than the inorganic; while, of the inorganic, the ferric salts possess these properties in a greater degree than the ferrous salts.

Several compounds of iron may be employed as astringents and stimulants; but, when a stimulant is required, other metallic preparations are preferable. The sulphate and especially the ferric chloride, solid or in solution, are employed to check hæmorrhage. The chloride is a powerful styptic, and readily controls the bleeding from small vessels, but it has the disadvantage of irritating the surface of wounds and preventing union by first intention. Carbolic acid will probably supersede perchloride of iron; for this acid, properly employed, does not hinder the immediate closure of a wound.

The soluble preparations of iron have a metallic astringent taste, and act on the mucous membrane of the mouth as on the abraded skin.

Iron salts are never employed as topical agents in diseases of the mouth; and as they often discolour the teeth and stain the tongue black, especially when the breath contains sulphuretted hydrogen gas, arising from carious teeth, etc., they may be taken through a quill, glass tube, or reed. They are conveniently given in the form of pill.

The effects of these salts in the stomach differ according to their properties. Some are astringent, stimulating, and in large doses irritating to the mucous membrane, as the pernitrate, the perchloride, the iodide, and the sulphate, while the remaining preparations with respect to this membrane are almost inert. If the stomach is irritable, bland preparations of iron must be chosen. It is often stated that chlorotic or anæmic patients with weak stomachs must be treated with bland unirritating preparations of iron. In some instances, no doubt, the astringent preparations are unsuited, but in most cases they produces far better results than the bland forms of iron. A pale, flabby, broad, and teeth-indented tongue indicates almost always the need of large doses of the astringent preparations of iron. Thirty drops of the tincture, or three or four grains of the sulphate, may be given three times a day. Weak anæmic girls, suffering from pain and vomiting after food, with perhaps tenderness of the skin at the epigastrium, are often effectively treated by large quantities of the tincture of the perchloride.

The soluble preparations of iron combine with the albumen in the stomach, while the insoluble preparations are dissolved to a variable extent in the acids of the gastric juice. The reduced iron is pretty freely soluble in the gastric juice but gives off hydrogen gas, or, if the preparation is impure and contains a sulphide, sulphuretted hydrogen; either gas causing eructations, and the sulphuretted hydrogen a very disagreeable taste. The peroxide if strongly heated, is soluble in the stomach with great difficulty; the more slightly heated forms should therefore be preferred. The carbonate and the magnetic oxide are more easily dissolved than the sesquioxide.

The metallic preparations and the proto-salts, after undergoing solution, become converted, either in the stomach or duodenum, into per-salts, very likely by means of the oxygen of the air swallowed with the saliva.

The astringent preparations, as the perchloride, acetate, pernitrate, or sulphate, are employed to check hæmorrhage from the stomach. In proportion to their astringency, these preparations confine the bowels; but to this rule there are exceptions. As soon after quitting the stomach they are changed into an insoluble and inert sulphide, their astringency must be exerted on the upper part of the small intestines.

The sulphate, acetate, perchloride, pernitrate, in common with other astringent metallic preparations, may be given in diarrhœa. The pernitrate, much praised in the chronic forms of diarrhœa, is probably an efficient preparation.

Owing to the astringency of iron salts, each dose should be combined with some laxative, as a quarter of a grain of aloes, a few grains to half a drachm of sulphate of magnesia, soda, or potash. Some authorities consider that the combination of iron with a laxative markedly promotes the absorption of the iron.

In their course along the intestines, iron salts, as we have said, are changed into a sulphide of the metal, giving to the fæces a black and characteristic appearance. A very small quantity of an iron salt is sufficient to stain the motions deeply, and to keep them darkened for several days after its discontinuance. Iron salts have no direct influence on the pancreatic or biliary secretions.

In the treatment of the small thread-worms infesting the rectum, the tincture of the sesquichloride, in the strength of a drachm of the tincture to half a pint of water, is an efficient injection; it coagulates the albumen and destroys the thread-worms.

It is an interesting and important question,—How much iron is absorbed into the blood? Probably but little of the insoluble forms, as the quantity of acid in the stomach is not adequate to dissolve them; and as regards the soluble preparations it is hard to say how much gets into the blood. The increase of the iron in the urine being very slight after administering a soluble iron salt, it has been concluded that very little passes into the blood; and the fact that almost all the iron taken by the mouth may be re-obtained from the fæces, seems to strengthen this view; but an extended knowledge concerning the elimination of metals from the body shows this conclusion to be fallacious. Probably most metals, but certainly iron, are eliminated from the system through the intestines, and make their exit with the fæces; for, when iron salts are injected into the blood, almost all the metal is ultimately recoverable from the fæces. That much more is absorbed than is appropriated by the blood corpuscles, is shown by the coloration iron produces in all the albuminous secretions of the body, the fluids bathing the various cavities becoming coloured reddish-brown.

Oxide of iron possesses an ozonizing power. "Thus, a spot of iron mould, *i.e.* iron oxide, on linen, will in time destroy the fabric. From a similar cause a fleck of rust on a bright surface of steel will steadily enlarge and deepen" (Horatio Wood). Hence it is argued that the iron of the blood corpuscles acts in the same way, converting oxygen into ozone, thus promoting oxidation; ozone being the active form of oxygen in the system.

In the treatment of anæmia, many physicians advocate the use of large doses of iron salts; others, instancing the beneficial effects of ferruginous waters, strenuously maintain that all the good effects are obtainable from very small doses. In many instances, no doubt, anæmia is curable by the employment of small quantities of iron, but it is likewise certain that large quantities, when they can be borne, act far more promptly. Half-drachm doses of the tincture, or six to eight grains of the sulphate, may be given two or three times daily. The following pill, originally employed by Blaud and strongly recommended by Neimeyer, is no doubt very efficacious; but the iron without the carbonate appears to answer as well:—sulphate of iron, carbonate of potash, of each half an ounce; tragacanth, as much as is required to make ninety-six pills; three to be taken three times a day, an additional pill being added daily.

A convenient pill is made with five grains of the dried sulphate of iron, equal to about nine grains of the ordinary sulphate, with a drop of syrup. This sets into a firm pill, easily dissolved in the stomach; a small quantity of extract of belladonna may be added to prevent constipation, but when given alone this pill seldom constipates. Large doses of iron, while rarely upsetting the stomach or producing headache, often cure anæmia with astonishing rapidity.

In anæmia, iron salts possess other important properties than their influence over the growth of the corpuscles. They act bracingly on the relaxed mucous membrane of the digestive canal, and probably in this way tend to restore its functions. Moreover, it is highly probable that the iron after its entrance into the blood exerts an influence beyond that of merely increasing the quantity of red corpuscles; hence iron salts are useful not only as a food to promote the formation of blood discs, but likewise on account of their beneficial influence on the tissues. Iron, therefore, must be regarded as a food, and also as an important curative agent. Where it is desired to benefit tonically the mucous membrane of the digestive canal and the tissues, large quantities of the soluble astringent preparations should be administered.

The experience of physicians of the last generation accorded with these views, and so does that of many highly practical men of the present day; but on the introduction of the bland and almost tasteless preparations of iron, they were assumed to be in every way superior to the astringent forms. Their comparative tastelessness is certainly in their favour. It used to be considered, mainly on speculative grounds, that the astringent preparations must disorder digestion. These theoretical and as I believe unfounded opinions still prevail. In a certain class of anæmic patients, the astringent preparations, even in large doses, are preferable, and a large share of their efficacy is due to their direct action on the mucous membrane of the stomach and intestines and on the organs which stud them. It has been experimentally shown that sulphate of iron does not check the solvent action of the gastric juice, and experience justifies the conclusion that in weak anæmic patients it does not lessen, but rather increases the formation of this secretion.

If the digestive mucous membrane is in an irritable state, then, as has been previously pointed out, the astringent iron preparations, in full doses, may do harm.

Individual peculiarities must be taken into account. Some persons cannot take iron in any form, not even a single dose of a weak ferruginous water. Iron upsets the digestive organs of some patients, or it induces fulness and pain in the head; others again, take it not only without inconvenience, but with great benefit.

It is sometimes advisable to humour the stomach by changing occasionally the preparation of iron.

According to most authorities, the iron in the blood combines with albumen. Bernard thinks it exists in the blood as a protoxide. Under certain conditions, iron increases the quantity of blood corpuscles, and in this way improves the general nutrition of the body.

Thus, iron salts are useful "in maladies attended with defect of the red corpuscles; as in anæmia, with or without irregularity of the uterine functions (chlorosis, amenorrhœa, dysmenorrhœa, and menorrhagia) whether occurring spontaneously and without any obvious cause, or resulting from profuse discharges (hæmorrhages, fluxes, as leucorrhœa, &c.) or from food defective in either quantity or quality, and from deficiency of light and pure air. If conjoined with sufficient nourishing food, pure air, abundance of light, and, when necessary, the employment of purgatives, iron cures these anæmic cases. But, when the anæmia or hydræmia is dependent on organic disease, as cancer, granular degeneration of the kidney, or morbis cordis, iron at best is only palliative."

"In some chronic affections of the nervous system, iron is of great benefit. Chorea, in a large number of cases, may be relieved, and oftentimes cured, by chalybeates, though in general arsenic usually cures chorea much more speedily and certainly. Cases, however, sometimes occur in which the chalybeates are preferable, as where anæmia co-exists. Epilepsy and hysteria are sometimes benefited by a course of iron, especially when they are attended with anæmia or uterine obstructions." (Pereira.)

The long-continued use of iron is highly beneficial in scrofula and rickets.

Iron-salts are commonly administered in amenorrhœa; as there is usually much anæmia conjoined with this affection, the iron, in remedying the anæmia assists in restoring the uterine functions.

It must be remembered that anæmia is dependent, not on deficiency in the supply of iron, but on its scanty assimilation; hence iron must be conjoined with well-regulated hygienic conditions, otherwise it does comparatively little good.

In a case of neuralgia with anæmia when no organic cause can be discovered, salts of iron are especially recommended, although it is true their action is uncertain. The huge doses of these salts sometimes given, especially of the sesquioxide, are probably injurious, and exert less influence over the disease than smaller ones.

Large doses of perchloride of iron are of great benefit in diphtheria. It is a good plan to use the solution rather than the tincture, and to give the medicine very frequently—every hour, or even oftener. It is uncertain whether the effects on the throat depend on the topical action of the medicine, or whether they take place after its entrance into the blood. The solution should be frequently painted on the throat, taking great pains to apply it very gently, lest by increasing the inflammation it may do more harm than good; this process appears to arres the spread of the disease, and it is said to maintain the strengt of the patient. The solution may be applied with the atomize so as to penetrate into the trachea and bronchial tubes. Larg hourly doses of the perchloride have been found of great use i erysipelas, though with some observers this treatment has altogether failed, a result perhaps due to the long intervals betwee the doses. The *frequent* repetition of the medicine is one of th most necessary conditions of success.

In the so-called hysteria of middle-aged women, occurrin especially at the cessation of menstruation, they often experienc distressing fluttering of the heart, a sensation of fulness of th head, with heat and weight on the vertex, frequent flushings o the face, and "hot and cold perspirations." This combinatio of symptoms is generally removed by considerable doses of th sesquichloride of iron, given three times a day. If the symptoms are limited to the head and face, other remedies are mor successful, as nux vomica, opium, belladonna, bromide of potassium, nitrite of amyl.

Salts of iron sometimes excite irritation of the bladder, wit frequent desire to pass water, which may contain a considerabl quantity of mucus. With children they may cause nocturna incontinence of urine, yet iron salts not unfrequently cure thi troublesome complaint, even when not dependent on worms i the rectum, or other irritation. Astringent preparations of iro are employed to arrest hæmorrhages from the lungs and kidneys; the acetate is the best preparation and the following i stated to be a very effectual way to administer it:—Add sufficient salt of iron to water to make it taste distinctly but no disagreeably, and let the patient constantly sip this solution A sufficient quantity can thus be taken without exciting nause or disgust; indeed, it is often liked.

Salts of iron appear to lessen profuse secretions, such as occu in chronic bronchitis and leucorrhœa. Dr. Graves gave the compound iron mixture, in doses of one or two fluid drachms, to check excessive bronchial secretion.

The iodide of iron may be given where both iron and iodide are indicated, for instance, in syphilis complicated with anæmia. It is a question of much interest whether it is better to administer these two agents separately or combined in the iodide of iron, and whether they continue in combination in their course through the stomach and circulation, or whether the salt is decomposed. Viewing this question simply from a chemical point of view it would seem that an iodide of sodium and albuminate of iron must be formed in the stomach or blood. Some observations, made, I believe, by Bernard, throw much doubt on this conclusion; for it was found that if iodide of potassium and a salt of iron were injected into the blood, no iron appeared in the saliva, but if an iodide of iron was injected, then both iodide and iron were found in this secretion.

The iron of the effete red corpuscles probably escapes with the bile; and when iron salts are swallowed, this fluid contains an excess of the metal. This, therefore, is one way by which iron may be separated from the body.

Its further separation takes place by means of the albuminous secretion of membranes; and as iron, like most other metals, very probably exists in the body only as an albuminate, it has been conjectured that it can be separated only by the secretions containing albumen; and certain facts and considerations favour this view. When iron is injected into the blood, much of it reappears in a short time on the surfaces yielding an albuminous secretion, as the mucous membrane of the intestines, of the bronchial tubes, of the gall-bladder, of the urinary bladder, and on the serous membranes, as the pericardium, peritoneum, and pleura. A small quantity escapes with the urine; but whether excreted by the kidneys, or separated by the mucous membrane lining the urinary passages, is uncertain. Some maintain that it is separated by the mucous membrane, and in support of this view it is urged that when the iron of the urine is much increased, irritation of the mucous membrane always sets in, as is shown by the frequent desire to make water, and by the excess of mucus in the urine.

To Dr. Barnes we are indebted for having suggested the injection of perchloride of iron into the uterus in grave cases of flooding after delivery. In such cases, obstetricians are well-nigh agreed that this procedure is more effective and life-saving. Dr. Barnes recommends four ounces of the liquor ferri perchloride mixed with twelve of water, to be slowly injected into the uterus with a Higginson's syringe, furnished with a long uterine tube, taking care to avoid the introduction of air.

In chronic uterine catarrh with clear white-of-egg-looking discharge issuing from a patulous uterus, Dr. Lloyd Roberts recommends the interior of the organ to be swabbed with a solution compound, one part of perchloride of iron to four of water; or the injection of a few drops of the solution.

The tincture of the perchloride of iron, in the proportion of half a drachm to half a pint of water, with a drachm of laudanum, makes a capital injection for gonorrhœa or gleet, often speedily checking the discharge, and easing the pain on micturition. Mr. C. C. Fuller, of Albany Street, finds the following injection useful:—Sulphate of iron, twelve grains, tincture of opium, half an ounce, water, eight ounces, use three times a day.

The syrup of the phosphate of iron is a good form, if there are any indications for the employment of phosphoric acid. (See Phosphate of Lime).

NITRATE OF BISMUTH, CARBONATE OF BISMUTH.

THESE powders are commonly used as harmless cosmetics; they are useful in intertrigo, and sometimes in eczema, as dusting powder; bŭt in eczema other remedies are to be preferred.

Applied to the broken or unbroken skin, these substances, being insoluble in any fluid they may then meet with, are not absorbed.

Trousseau employed equal parts of bismuth and Venetian calc in chronic non-syphilitic ozœna, ordering the patient, after clearing the nasal passages by strongly blowing the nose, to snuff up some of this powder. He, however, prefers mercurial powders. (See Mercury).

Being insoluble, they are tasteless, but they sometimes occasion a disagreeable sensation of roughness, and sometimes blacken the tongue. This rough taste may be covered in a great degree by administering the drug in milk.

Little is known at present of the changes these medicines undergo and of their behaviour in the stomach. Whether they are dissolved or not, or whether their efficacy depends on physical or chemical properties, are questions yet unsolved.

In many diseases of the stomach, these preparations, especially the nitrate, are very valuable, easing the pain incident to many affections of this organ, whether depending on organic or so-called functional disease. In cancer, chronic ulcers, and chronic inflammation of the stomach, bismuth is often serviceable, and it is especially useful in the chronic gastritis of drunkards, subduing the pain, checking the vomiting, and enabling the stomach to tolerate food. It is also useful in gastrodynia and cramp of the stomach. Many forms of vomiting in children, and notably that kind depending on acute or chronic catarrh of the stomach, yield speedily to bismuth. The various forms of pyrosis, whether acid, alkaline, or neutral, are very amenable to this drug, although our limited knowledge concerning the causes of this form of indigestion fails to enable us to lay down precise rules respecting the particular form of it most benefited by bismuth.

Dr. Graves treated acidity of the stomach successfully with nitrate of bismuth, and experience confirms his recommendation. He generally mixed it with opium or morphia, and sometimes magnesia. Flatulent dyspepsia, in some of its forms, yields more or less to bismuth; and it is well sometimes to mix it with an equal quantity of vegetable charcoal.

These remedies often succeed in some forms of chronic diarrhœa, especially when other drugs fail in the exhausting purging of phthisis. It is necessary to give as much as half a drachm to a drachm of the nitrate several times a day, and this large quantity, taken with milk, does not disturb the stomach. It often subdues intractable diarrhœa, effecting occasionally so great an improvement in the general health, that patients, rally and recover, whose speedy death seemed inevitable.

In the various forms of diarrhœa peculiar to young children bismuth, in large doses is freely used on the Continent. Thirty to sixty grains hourly are recommended, milk being at the same time withheld. Much smaller doses, however, are often useful and may be given with milk; a grain hourly is very efficacious, and the addition of a sixth of a grain of grey powder often enhances its good effects.

Bismuth preparations are not employed to act on the remote organs of the body.

A bismuth injection, consisting of bismuth, half an ounce, glycerine, half an ounce, water, three ounces, is very useful in gonorrhœa, especially in its chronic stage and sometimes proves serviceable in gleet.

The chief part, if not all the bismuth swallowed, is evacuated with the fæces. A portion indeed may be absorbed, but the quantity entering the blood is probably extremely small.

LEAD SALTS.

Lead added to albuminous fluids, forms a precipitate composed of albuminate of lead. Like other metals, the soluble salts of this group, when applied to the abraded skin or to sores, or to mucous membranes, coat them with an impermeable air-proof covering; if, however, a protecting covering is required, other metals are generally employed. Any excess of lead solution after combination with the albuminous part of the secretion will unite with the tissues themselves, in which manner, probably, lead salts condense these structures, and constringe the blood-vessels. The soluble lead salts are used as lotions to unhealthy and over-secreting sores, and to eczematous eruptions; lead lotions in some forms of eczema being very useful. When there is much inflammation, and when the surface is raw and weeps copiously, a lead lotion allays inflammation, checks the discharge, and quells the itching, burning, and tingling, so often accompanying eczema. Two or three drachms of liquor plumbi in ten ounces of water is generally sufficient; but a stronger lotion, consisting of two ounces of liquor plumbi, two ounces of glycerine, and four ounces of water, is sometimes more successful. When the inflammation is great, and the weeping abundant, the rash must be constantly covered with rags soaked in the lotion. In some cases it is useful to apply a poultice at night and the lotion during the day. The stronger lotion is especially useful in diffused eczema, without weeping, but with excessive itching and tingling, and the diseased skin should be sponged with the lotion several times a day. A weak alkaline or a sulphur bath greatly assists the action of the lotion. The fluid oozing so abundantly in eczema being strongly alkaline, the property of these lotions to check this discharge may be owing to their weak alkaline reaction (*vide* the Chapter on the Topical influence of Acids and Alkalies on the Secretions). The stronger lotion very effectually allays the itching of pityriasis. Lead lotions occasionally ease the itching of urticaria.

A lead lotion is often of great service in pruritus pudendi, especially when the mucous membrane is red and excoriated. A weak lotion sometimes fails where a strong one succeeds. It may be necessary to use equal parts of liquor plumbi and glycerine, an application which may excite a little very temporary smarting. When pruritus pudendi depends on ascarides, hæmorrhoids, or a tumour in the urethral passage, it is obvious that these applications are useless.

A lotion of one part of liquor plumbi,* with one or two parts of glycerine, applied warm after the crusts have been entirely removed, is useful in the milder forms of lupus.

While lead salts have many properties in common with those of other metals, they are distinguished by their unirritating, soothing character, whence they are used only as astringent and calming applications. The soluble lead preparations may be used to check bleeding from small vessels: but other astringents are more effective.

Solutions of the acetate and diacetate are employed as injections and washes in chronic otorrhœa and vulvitis of children. They lessen the production of pus, and ease pain, by virtue of their astringency and their soothing qualities. They are of most use when the acute stage has just subsided, the tissues remaining irritable and painful. In the later stages stronger astringents are needed.

Bland, unirritating plasters made of lead are in common use. These plasters, and lead applications generally are sometimes objectionable, owing to the black discolouration they produce from the formation of the black sulphide with the sulphuretted hydrogen gas evolved by the decomposition of the discharges.

A stout plaster often relieves pain in the loins, due to weakness. Burgundy pitch on leather is generally used, but it is very liable to produce a crop of itching papules which may spread over the greater part of the body, while lead plaster, though somewhat less adhesive, is comparatively free from this objection. Plasters sometimes relieve back pains due to uterine disease or piles.

For sweating feet, Hebra employs an ointment composed of equal parts of lead plaster and linseed oil spread on linen and wrapped round the feet, renewing the application every third day for nine days.

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* When liquor plumbi is mentioned, we refer to the strong solution.

The same ointment applied on soft linen twice daily is sometimes invaluable in the sub-acute stage of eczema.

In ulceration and sloughing of the cornea, lead washes must be avoided, lest a white compound become deposited in the structures of the ulcer, leaving a permanent opacity.

Lead injections are sometimes employed in gonorrhœa, gleet, and leucorrhœa.

Lead may be absorbed by the skin in quantity sufficient to produce lead poisoning, entering the blood probably as an albuminate, which is soluble in weak acids and alkalies. Lead-poisoning occurs only when the solutions are applied continuously to large raw surfaces; moreover, this remote possibility should not in any way inhibit the use of lead lotions.

Insoluble lead salts are tasteless; the soluble have a sweetish acid and astringent taste.

The soluble preparations are astringent to the mucous membrane of the mouth, and combine with the albuminous substances they meet with there.

That portion of the soluble compounds of lead which escapes combination with albumen in the mouth, is converted into an albuminate in the stomach.

The soluble lead preparations are sometimes used in hæmatemesis, and have been recommended to check pyrosis.

Albuminate of lead in the intestines is probably speedily decomposed into a sulphide of lead, an insoluble and inert compound. The soluble salts act powerfully as astringents of the intestines, and cause constipation; they control many forms of diarrhœa, even that dependent on disease of the lower part of the small or even of the large intestine.

The effects of lead on the parts of the intestines distant from the stomach and duodenum can be manifested only through the nervous system; and we know the intimate sympathy existing between the different parts of this canal.

In summer diarrhœa, a few grains of the acetate with a small dose of morphia is a sure and speedy remedy.

The acetate has been recommended in cholera, especially in its early stages. In the purging from dysentery and typhoid fever, and from tubercular disease of the intestines, few remedies are so useful. The acetate should then be combined with opium.

It increases the efficacy of a starch injection, used to check various forms of diarrhœa; and it may be used for a similar purpose as a suppository.

In large doses, the acetate acts as a weak irritant poison, but the symptoms it produces differ from those of other irritants chiefly by constipating instead of purging.

It is by no means common to meet with a case of acute poisoning with lead salts, and even the most soluble salts rarely cause death.

Acute poisoning by the acetate induces the following symptoms:—Dry burning sensation in the throat, thirst, vomiting, colic, (the pain of which is generally relieved by firm pressure), tenderness of the abdomen, obstinate constipation, dark slate-colour motions from the presence of plumbic sulphide, great prostration of strength, cramps of the extremities, cold sweats, giddiness, numbness and even paralysis of the lower limbs; sometimes coma; and high-coloured scanty urine. In one case it is reported that in less than five hours the extensor muscles of the extremities became paralysed, and the flexors rigidly contracted. The subacetate is even more powerful than the acetate. The carbonate has no irritant action.

The treatment of acute poisoning is to promote vomiting by lukewarm drinks, to give sulphate of soda, or sulphate of magnesia, or fresh precipitated sulphide of iron, which is rarely at hand; the stomach-pump should be used, and milk, with white of egg, may be given with advantage.

Small, nay even minute, quantities taken for a long time, will produce chronic lead-poisoning, which may occur in various ways, owing to the manifold uses of lead compounds. Oxide of lead is used to sweeten wines, the soluble salts are used as hair dyes, and wafers are often coloured with red lead. In grinding the carbonate, the basis of all paints, unless great care is taken the finer particles are inhaled. Snuff is sometimes adulterated with lead, and sufficient may be snuffed into the system to produce chronic poisoning. Dr. Garrod has lately narrated an instructive case of chronic lead-poisoning through the decomposition of the leaden envelope of a packet of snuff. Painters become poisoned by eating their meals with unwashed hands, and so introducing lead into the system. Drinking-water sometimes becomes contaminated with lead dissolved from the lining of tanks. Certain conditions of the water either favour or retard the solution of lead. Thus, pure water, and waters

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It increases the efficacy of a starch injec augmenting that of the blood, and thus we have the pathological condition which excites the gouty inflammation. Dr. Garrod has further shown,—and his experience is corroborated by all who have investigated this subject,—that gout very frequently occurs among lead-workers, and that gouty patients often exhibit the characteristic blue lead line on their gums.

There, too, is the fact, in further confirmation of Dr. Garrod's discoveries, that if to a gouty person, free at the time from an acute attack, a salt of lead is administered, it developes acute gout, with its accompanying symptoms of severe pain and high fever. The author has repeatedly verified this fact, first pointed out by Dr. Garrod, which affords an explanation, in part at least, of the good effects of iodide of potassium on gout, since, as we have shown already, this salt promotes the excretion of lead.

Lead is used for a variety of purposes, but chiefly for its astringent action on the tissues, as in profuse discharges of the mucous membrane from the lungs in bronchitis, and to check bleeding from the nose, lungs, kidneys, and uterus.

It has been conjectured that lead in Bright's disease might check the escape of albumen from the blood and therefore lessen the amount of it in the urine and George Lewald has published some experiments instituted with the view of testing this point. He does not mention the form of kidney disease his patients suffered from, but it was probably the pale, flabby, fatty kind. He observed at the same time the influence of the lead on the amount of urine voided. These experiments, too few perhaps to decide the question, showed that lead constantly diminished the albumen of the urine, though only to a very small extent, namely, to about nine or ten grains in the twenty-four hours. The diminution appeared to hold no relation in the quantity of lead administered. The quantity of water was simultaneously increased on an average by 200 c.c. in the twenty-four hours. [illegible], the increase held no proportion to the quantity of [illegible].

[illegible] been found in the lungs, kidneys, spleen, liver, and [illegible] there is no evidence of its possessing an especial [illegible] parts.

[illegible] has investigated the influence of lead-poisoning [illegible] that women working in lead factories fre- [illegible] that the father may cause abortion, even when the mother is not a lead-worker. In 123 pregnancies, seventy-three children were born dead; and of these, sixty-four were abortions, four premature births, and five born at the full time. Of the fifty born alive, twenty died the first year, eight the second, seven the third; one later; and only fourteen reached the age of ten.

We know but little concerning the elimination of lead. Only a little lead passes off with the urine; iodide of potassium, however, increases its elimination.

It is a further question whether the metal is separated by the kidneys with the urine, or by the mucous membrane of the urinary tract. On theoretical grounds it is difficult to imagine how metals, existing in the body as albuminate, can be eliminated with a non-albuminous secretion; moreover, after the administration of lead, as after that of iron and other metals, an increased quantity of the metal is detectible in the urine; an increased amount of mucus too, simultaneously, with signs of irritation of the lining membrane of the bladder, even to the extent of inducing a catarrhal condition; whence it has been inferred that the metal is separated with the mucus secreted by the mucous membrane.

NITRATE OF SILVER, OXIDE OF SILVER.

The soluble preparation of silver, when painted on the skin, colours it first an opaque white, which changes gradually to brown and black. The application of a strong solution will produce vesication. Nitrate of silver is sometimes applied as a destructive caustic to warts and other excrescences, but its action being too superficial it is useless for this purpose.

Applied to the abraded skin or to sores, the soluble silver salts form an albuminate which coats the surface with a thin layer and protects the tissue beneath from the irritation of the air. The nitrate of silver acts as a powerful excitant of the tissues and destroys them, but only very superficially. It is frequently applied to induce healthier growth in unhealthy and unclean ulcers, giving much smarting pain, which, however, soon passes away.

Like most other soluble metallic preparations, the nitrate causes condensation of the tissues as well as contraction of the blood-vessels, on which account it is used to stay hæmorrhage, being liable, however, to excite much inflammation and pain, other blander astringents should first be tried. Sometimes it is used to check the bleeding from leech-bites by touching them with a stick of nitrate of silver.

Nitrate of silver will prevent the pitting of small-pox, if each vesicle is opened as soon as formed, and the raw surface beneath touched with a solution of the salt. Dr. F. Bowen has recorded an instructive case showing the efficacy of this treatment. He treated the vesicles on one side of the face and neck in the way described, leaving untouched the vesicles on the opposite side, with the result that on recovery the untreated side was deeply pitted, while the opposite side remained smooth and scarless. Dr. Bowen, who has devoted much attention to this subject, states that a nurse can easily carry out the process. At an early stage of the eruption, at the latest on the fourth or fifth day, he punctures the vesicles with a fine needle dipped in a solution containing twenty grains of nitrate of silver to an ounce of water. Mr. Higginbottom finds it unnecessary to puncture the vesicles, and says it is enough to paint the skin in the manner recommended by him in erysipelas, which subdues inflammation and prevents suppuration.

Bed-sores are best prevented by painting the threatened but unbroken skin, as soon as it becomes red, with a solution of nitrate of silver (20 grains to an ounce) with the effect of dispersing the redness, hardening the skin, and preventing the bed-sore, unless, as in the case of paralysis, there is a great proneness to this lesion.

That species of boil which, beginning first as a papule, maturates into a pustule, and inflames and extends till a large dead core is produced, may, it is said, be arrested in its early pustular stage by painting it over at its very commencement with a strong solution of nitrate of silver. I have had no experience of this method; but of the beneficial influence of collodion on similar boils, to be mentioned in another place, I can speak with great confidence.

Nitrate of silver will arrest herpes labialis and the vesication of shingles, if the warning patch of erythema is painted over, before, or as soon as, the vesicles begin to form.

We sometimes meet with a patient with a patch of lichen, the size of the palm of the hand, affecting almost any part of the body, the irritation from this patch being sometimes so excessive as even to break the sleep, and injure the health. The painting the patch with the nitrous ether solution of silver every day, or second day, as the itching may require, will generally cure this affection.

Limited patches of eczema are sometimes benefited in the same way. Nitrate of silver proves most serviceable after the weeping stage.

The occasional application of nitrate of silver or sulphate of copper is serviceable in psoriasis of the tongue and mucous membrane of the mouth; but if it depends on syphilis, mercurial applications are best. A weak solution of nitrate of silver, gradually strengthened, is stated to be useful in the superficial kinds of lupus.

Higginbottom very strongly recommends the local application of nitrate of silver in erysipelas. No agent, he says, is so safe or so efficacious in subduing external inflammations; but he points out that the success of this treatment depends entirely on the manner of conducting it. He directs the skin to be well washed with soap and water; then with simple water; then to be wiped quite dry; next, a solution of four scruples of the brittle stick of nitrate of silver, in four drachms of water, is to be applied two or three times to the inflamed surface, extending two or three inches beyond it.

Nitrate of silver often cures the intolerable itching of pruritus pudendi. A large camel-hair brush saturated in a solution containing from two to five grains to the ounce, should be painted three or four times a day over the vulva, and be thrust up to the os uteri. A stronger solution used less frequently will not answer so well.

A weak solution of nitrate of silver often relieves pruritus ani.

Pruritus cutaneus of the meatus auditorius, occurring without any eruption should be treated by the application of a strong solution of nitrate of silver, carefully avoiding the membrana tympani. If the itching arises from undue dryness of the ear from deficient secretion of wax, almond oil or glycerine should first be tried.

When used as an outward application, nitrous ether is by far the best solvent of nitrate of silver, for by dissolving the fatty matters of the skin this solution forms a uniform layer over the surface, unlike a watery one, which runs into drops leaving the intermediate skin dry. This solution is not available in erysipelas, as nitrous ether will not dissolve the quantity of silver required. It is important to bear in mind that a nitrous ether solution acts much more strongly than an aqueous solution of corresponding strength. The ether solution must therefore be made weaker, five to ten grains to the ounce being generally strong enough. Five grains to the ounce is sufficiently strong for threatened bed-sore, a stronger solution often blistering, particularly on applying several coats.

Solutions of nitrate of silver are used to blacken the hair of the head. The hair is first washed with the solution of nitrate of silver, and then a comb, dipped into a solution of sulphide of potassium, is passed through it; a process resulting in the production of a dull, lustreless, ghastly, black-bluish colour.

In obstinate tinea tarsi, the solid nitrate of silver stick is sometimes passed over the edges of the eyelids, first removing the eyelashes and the scabs.

In conjunctivitis a few drops of a solution of nitrate of silver, varying in strength, is inserted with the aid of a quill several times a day into the eye, exciting in the membrane a healthier inflammation, which soon subsides.

The nitrate may be applied to ulcers of the mouth. When a milder application than the ordinary caustic is required, it is convenient to use the sticks composed of equal parts of nitrate of silver and nitrate of potash.

The soluble salts have an astringent metallic taste.

In the early stage of inflammation of the throat, when the inflammation is superficial and there is only a little swelling, the application of a strong solution, or of the solid stick of nitrate of silver, subdues and sometimes even extinguishes the inflammation.

In chronic sore throats, when the tissues are relaxed and covered with pus, solutions of the nitrate are serviceable, but the author does not think they are superior in any way to strong astringent and unirritating applications. Even ulcers are best treated by the glycerine of tannin; but if in a sloughing and unhealthy condition, then the irritant nitrate must be preferred. The nitrate of silver is also applied with doubtful benefit in diphtheria. Most authorities are agreed that the application should be limited to the inflamed patches; for if applied beyond their area, it excites an extension of the inflammation, on which the false membrane may readily implant itself.

Nitrate of silver, in powder or solution, is sometimes applied by means of a probang, brush, or sponge, to the chronically inflamed larynx, as in phthisis; or solutions of nitrate of silver, in the proportion of gr. ½ to gr. v. to the ounce of water, may be brought to bear on the pharynx and larynx by the spray producer.

Dr. Horace Green injects a solution of nitrate of silver into the trachea in asthma, bronchitis, and phthisis, after deadening the sensibility of the glottis by applying to it for one or two weeks a solution of nitrate of silver. He passes a No. 10 or 12 catheter which produces only a sensation of warmth, through the rima glottidis down even to the bifurcation of the trachea and injects the solution. The late Dr. Hughes Bennett, who endorsed this treatment, injected either two drachms of a solution containing half a drachm of nitrate of silver to an ounce of water, or even half an ounce of a solution consisting of forty grains of nitrate of silver to an ounce of water. While introducing the catheter the head is thrown back and the tongue drawn forward, when the instrument glides along the laryngeal surface of the epiglottis, which is nearly insensible, through the rima glottidis itself.

Sponging out the throat with a solution of nitrate of silver greatly diminishes the violence and frequency of the paroxysm in whooping cough, renders the cough but half as frequent, makes the fits much less severe, and enables a child harassed with broken sleep to obtain a good night's rest. But there is a formidable drawback to this treatment; for the application generally produces, especially with very young children, so violent an attack of coughing, as to excite fears lest suffocation should ensue. Instead of sponging the throat, the nitrate of silver may be applied in the form of spray by the atomizer. Very young children, however, cannot be induced to open their mouths, and allow the inhalation of the spray; hence its use is restricted to children more than two or three years old. These applications being apt to excite retching, should be employed when the stomach is empty.

Any part of the salt having escaped conversion in the mouth is changed into an albuminate when it enters the stomach; and if sufficient albumen is not present to effect this, the salt attacks the mucous membrane, and excites active inflammation. The best antidote for a poisonous dose is common salt, a fact useful to bear in mind, if, as sometimes happens, the solid stick of nitrate breaks off and is swallowed.

Nitrate of silver acts as an irritant in the stomach, and may be used in precisely the same class of cases for which arsenic is applicable. It often checks the pain and vomiting of chronic inflammation, of chronic ulcer, and even of cancer, of this organ. It should not be given in the form of a pill, but in solution.

The nitrate acts as an astringent in the intestines, and, in common with several other metallic preparations, may be used in diarrhœa, both of the acute and chronic kind.

Peptones readily dissolve the nitrate and the solution does not coagulate albumen. Probably it enters the blood in this form and collects in the red corpuscles as other metals tend to do, if not speedily deposited in the organs or separated by the secretions. These salts being absorbed, are supposed to be astringent to the tissues to which they are conveyed, but this is a doubtful supposition, and they are never used to check either bleeding or secretion from the distant organs of the body.

In poisonous doses nitrate of silver excites in animals convulsions and paralysis, probably central in origin, the convulsions being very similar to those produced by strychnia, are excited by the least peripheral irritation.

Chronic poisoning by nitrate of silver produces general fatty degeneration, especially of the kidneys, liver, and heart.

Both the oxide and nitrate are employed in chorea and epilepsy, apparently with occasional benefit. The oxide has been given to check profuse sweating. If administered too long, these substances, in some form, probably as the reduced metal, are deposited in the deeper parts of the skin and most abundantly where the skin is finest and most vascular; but once deposited, the metal remains as a permanent discoloration, of a deep leaden hue, either by time or treatment irremovable, unless it should prove true that large doses of iodide of potassium, as has been lately stated, will wash out this stain. Silver appears to be chiefly eliminated by the intestines and bile, very little escaping by the urine.

The nitrate, in solutions of various strength, is used as an injection in gonorrhœa. Some advocate a very strong solution (twenty grains to the ounce), averring that in many instances the disease may at once be cut short by it; others prefer a much weaker solution of one or two grains to the ounce of water, repeating the injection several times a day.

A solution of glycerine of tannin, half the strength of the pharmacopœial preparation, is, I believe, a better injection for both gonorrhœa and gleet, than nitrate of silver.

MERCURY AND ITS PREPARATIONS.

THE salts of mercury possess very various physical as well as chemical properties; but as in every instance their effect on the system is well-nigh the same, probably all mercury compounds ultimately assume the same form in the blood.

The nitrates of the oxide and suboxide are escharotic; but much of this action is due to the free nitric acid of the salt. They are used to remove warts, condylomata, and other slight excrescences. Mercurial applications will completely allay the annoying itching of certain skin affections. Solutions of bichloride, black-wash, yellow-wash, or mercurial ointment, may each prove useful, but the application must be a strong one. Trousseau highly recommends bathing the part with a solution of about twelve grains of bichloride in a pint of very warm water. After much experience of these applications, I believe that far the best application, is an ointment composed of a drachm of calomel to an ounce of lard; but this ointment, in common with other mercurial applications, is not useful in all kinds of itching; for instance, it is unavailing in the irritation of urticaria.

Calomel ointment often immediately removes the itching of pruritus ani. This irritation may be due to rashes, as psoriasis, lichen, or eczema, or no eruption may be visible, yet the ointment will prove equally efficacious. Sometimes the itching is felt along the raphé between the anus and scrotum, and may be due to little round spots looking like psoriasis, with the scales washed off. This form also yields to the ointment. This application is less frequently useful in pruritus pudendi. In obstinate cases of pruritus ani and pruritus pudendi, blisters to the thighs, or the application of a few leeches, sometimes afford relief.

The ointment in many instances improves the rashes themselves, but this is in some measure, due, to the cessation of the scratching on the disappearance of the itching.

Sometimes a little scabbiness of the head, looking like mild eczema, occurs in children, accompanied by a degree of itching sufficient to prevent sleep, and to cause constant restlessness. The calomel ointment speedily appeases this irritation.

The inunction with calomel ointment allays the distressing itching of the scalp sometimes accompanying pityriasis. It may be profitably added to other ointments used for the removal of pityriasis, as oxide of mercury or of tar.

It may be objected that so strong an application of mercury, especially when applied to soft and absorbing parts, as the inner surface of the vulva, and the skin around the anus, must surely produce salivation. No doubt care should be exercised, and no more ointment used than is needed. Yet the risk of salivation seems to be extremely slight; for, with a very large experience of the ointment, I have never seen salivation produced by it. Properly applied, a very small piece of ointment is generally sufficient to allay the irritation at once, and even to remove it altogether in a few days, although it is very apt after a variable time to return, when it again yields to a renewed employment of the unguent. Its grateful effects are often almost instantaneous, though sometimes it takes a few days to give ease. Having many times seen it succeed when other remedies have entirely failed, I am convinced of the value of this application in these harassing and perverse diseases.

The white precipitate or nitrate of mercury ointment or corrosive-sublimate wash will destroy the various kinds of lice and their nits which infest different parts of the body. For lice on the pubes it is necessary to apply the ointment or lotion to the scrotum, hair on the perinæum, and around the anus. The nits can be dislodged by washing the hairs with spirits of wine, which dissolves the gluey matter so strongly attaching the nit to the hair. If the lice have produced much rash, it is best to cut off the hair. The body louse may be killed by the essential oils, as the oil of rosemary, or by powdered pyrethrum, or by an ointment of staphisagria. Through the groundless fear of inducing salivation, some prefer these to mercurial applications. The under linen should be boiled to destroy any hidden lice.

The irritant ointments of mercury are useful in that obstinate and disfiguring affection, tinea ciliaris. The eye lashes should be cut short, and the ointment, either of nitrate or oxide of mercury, applied night and morning, picking off the scabs before each dressing. It is a common practice to dilute the unguentum hydrargyri nitratis with from four to six parts of simple ointment, whether used for rashes or tinea ciliaris, but in many instances the undiluted ointment is best, and it seldom requires to be reduced more than half the officinal strength, for the failure of the ointment in eczema, psoriasis, lichen, tinea ciliaris, is often due to its employment in too weak a form. Mr. Hutchinson and others assert that epilation ensures the speediest cure. Should these stimulating applications fail, others more powerful should be tried, as nitrate of silver, or sulphate of copper, the last-named salt being preferable, as it gives less pain.

Patches of obstinate lichen and psoriasis, especially of the hands, even when not syphilitic, will sometimes yield to mercury ointment when milder treatment fails. The calomel and nitrate of mercury ointment may be mixed, and the addition of tar ointment sometimes increases the efficacy of this combination.

Citrine ointment is also very useful in some cases of eczema, even in the weeping stage if there is but little inflammation, but it is especially useful in the stage of desquamation when the skin has healed. It is markedly serviceable when eczema affects the hairy parts of the face, often curing this obstinate form when other remedies have been tried in vain, and even when it fails to cure, it generally in great part subdues the disease. The same ointment is very beneficial too in pityriasis of the hairy parts of the face. In both eczema and pityriasis it is better to mix it with tar ointment, though this combination is sometimes more irritating than the simple citrine ointment: not unfrequently this mixture cannot be borne whilst the citrine ointment pure or diluted proves very useful.

In the early stages of acne a lotion composed of corrosive sublimate, one part: alcohol, enough to dissolve it; water, 100 parts, is said to be of use. A tea-spoonful is to be added to a quarter of a pint of water, and the face sponged with the lotion night and morning. The bichloride lotion, after a time produces a "scaliness and hardness of the cuticle."

Bichloride of mercury, one of the best parasiticides, is useful in favus, tinea sycosis, tinea tonsurans, eczema marginatum, and pityriasis versicolor (chloasma). A lotion containing two grains of bichloride to an ounce of water is generally sufficiently strong. In favus and tinea sycosis and tinea tonsurans, the lotion should be applied after each epilation, and should be continued for some time after epilation is discontinued. This treatment is highly spoken of by McCall Anderson.

It is taught, on high authority, that the application of mercury ointment in paronychia is very useful, repeated for ten minutes every hour, applying poultices at other times. Dr. Scott and Mr. McCormac both report several striking cases of rapid cures by dusting nitrate of lead on the diseased tissues night and morning.

Mercurial preparations are used as local applications in chronic inflammation; for instance, Scott's ointment is often employed in chronic inflammation of the knee-joint. Mr. John Marshall has recently introduced a new mercurial preparation, oleate of mercury, varying in strength according to the needs of the case, and variously combined with other remedies. Mr. Marshall's paper is so practical and valuable and so insusceptible of condensation or abridgment that we have deemed it best to reproduce the larger portion of it. These preparations, he says, "are cleanly and economical and have a much greater diffusibility or penetrating power than the old mercurial ointments, for they are absorbed by the skin with remarkable facility, and manifest the remedial effects with great promptitude."

"They should not be rubbed in like ordinary liniments or embrocations, but should be *merely applied with a brush, or be spread lightly over the part with one finger;* otherwise they may cause cutaneous irritation, or even produce a few pustules on the skin, especially in certain persons. This result may, however, be obviated by the addition of a small quantity of olive oil, or purified lard, according as an oleaginous or an unctuous preparation is required. Any of these forms may be scented by the addition of essential oils."

"In employing these mercurial solutions for combating persistent inflammation of joints, I soon found that the addition of morphia was of very great advantage. For this purpose the simple alkaloid must be used, as neither the hydrochlorate, the acetate, nor the meconate is soluble in oleic acid. For every drachm of the solution of oleate of mercury in oleic acid one grain of morphia may be added. Being, as well as the mercury, completely dissolved, it quite as rapidly penetrates the skin, comes quickly into contact with the extremities of the nerves, and thus, even within a few minutes, acts upon them at their most sensitive points, and speedily produces a soothing effect."

"The oleates of mercury and morphia, thus united in one preparation, represent, as it were, a liniment, ointment, or plaster of mercury and opium; but they are far more elegant, economical, and efficacious. As a rule, according to the size of the part affected, from ten to thirty drops are sufficient for one application. This should be repeated twice daily for four or five days, then at night only for four or five other days, and afterwards every other day, until a cure is obtained. The morphia immediately begins to relieve pain, allays the nervous irritation and consequent vascular turgescence, and thus arrests the progress or 'persistence' of the inflammatory process; whilst the mercury probably promotes the death and degeneration of the morbid products, and so facilitates their subsequent removal by absorption. Unless used in excessive quantity, the oleate of mercury does not salivate, or produce any marked constitutional disorder."

Mr. Marshall says "their applicability and utility appear to me to be almost co-extensive with the occurrence of 'persistent' or chronic inflammations, provided only that the seat of the disease be in, or sufficiently near to, the skin."

"I may first mention that not only in persistent articular inflammation, but also in simple synovitis, these remedies rapidly relieve the tenderness and pain, and promote the absorption of the fluid effused into a joint. They are also of decided benefit in the rheumatic, the arthritic, and the mixed forms of joint disease; but in these they do not, of course, supersede the necessity for general treatment. In inflammation of the mammary gland occurring during or after lactation or altogether independently of that secreting process, their efficacy is unequivocal; for I have seen, not only the induration left after previous abscesses, speedily disappear under their use, but a tendency to recurrent suppuration in the site of old abscesses, and the threatened formation of new ones, entirely controlled and arrested. I have also seen a threatened abscess in the perinæum from inflammation of one of Cowper's glands, and likewise the troublesome indurations left after ordinary perineal abscess, rapidly disappear on the use of these preparations. In obstinate and painful tonsillitis, in epididymitis, in periostitis, and in inflammation with imminent or actual suppuration in or around lymphatic glands, I have similarly employed them with decided advantage. In hydrocele they have not appeared to be useful. I have used equal parts of the 20 per cent. ointment and purified lard applied outside the eyelid, with success, in hordeolum and in palpebral conjunctivitis."

"In many cutaneous affections the oleate of mercury solutions, without morphia, form elegant and powerful remedies. It was in a case of obstinate sycosis menti that I first used, and with excellent results, an etherial solution of the perchloride of mercury mixed with oleic acid; but I now much prefer, as equally efficacious and far less irritating, the five per cent. solution of oleate of mercury in oleic acid, with the addition of an eighth part of ether. This, when applied to the skin with a camel-hair pencil, is a most diffluent and penetrating remedy. It enters the hair-follicles and the sebaceous glands, penetrates the hairs themselves, and carries everywhere with it its powerful metallic constituent. Besides sycosis, it will cure chloasma and the various forms of tinea; it is useful in porrigo and in pruritus ani et pudendi; but I have not found it serviceable in non-specific psoriasis or in eczema. The solution of oleate of mercury destroys pediculi immediately; and, owing to its singular power of permeation, simultaneously kills the ova—a result not always certain when ointments containing undissolved mercury are used."

"Again, in many of those syphilitic affections for the cure of which mercury is applicable, the oleate-of-mercury preparations offer some advantages. Thus, in congenital syphilis, a piece of the 20 per cent. ointment, about the size of a pea or bean, placed in the child's axillæ night and morning for fi rapidly and easily, and without any sign of uncleanliness, pro tional effects. Even in the adult this mode of introducing mercu tem, either for the cure of syphilis or other disease, may often be and less troublesome than, the bath, and it certainly gets rid of th to the ordinary mode of inunction. As a topical remedy for certain festations of syphilis, such as the non-ulcerated forms of syphiloder cially when these disfigure the head, face, neck, or hands, the 10 solution is a most valuable adjunct to other treatment, the spots rapidly pearing under its use. This, or the 20 per cent. preparation, diluted with parts of purified lard, may also be applied to non-ulcerated syphilitic indurated and condylomata, but it gives pain if applied to surfaces much excoriated, ulcerated, to moist warts, or to mucous membranes. In syphilitic iritis, also in non-specific forms of that disease, this diluted oleate ointment smeared over, not within, the eyelid, evidently promotes the absorption of the effused lymph. Lastly, in some of the remoter kinds of syphilitic affections, which iodide of potassium will usually cure, such as very hard nodes and certain forms of syphilitic testicle, the external application of the oleate of mercury is very valuable. I have seen a case of enlarged testicle and epididymis, the syphilitic origin of which had not been suspected, and for which no mercurial course had been prescribed, but which during a period of six years had been, from time to time, relieved by enormous doses of iodide of potassium, speedily and decidedly benefited by the inunction of the 20 per cent. mercurial oleate."

"In reference to other uses of the combined oleates of mercury and morphia, I may remark that I cannot doubt their value in the treatment of 'persistent' inflammation of certain internal parts and organs—as, for example, of obstinate pleurisy, pneumonia, pericarditis, and endocarditis; for they would here also allay pain and nervous irritation, would thus contribute towards the arrest of progressive disease, and would likewise promote the process of absorption. Moreover, I may state that a solution of morphia in oleic acid (one or two grains to the drachm, without mercury, is an excellent topical remedy in neuralgia, and in that exquisitely painful affection, herpes zoster, care being taken not to produce cutaneous irritation by friction. I have also used, endermically, with advantage, a solution of atropia in oleic acid, and have had prepared for me the oleates of zinc and copper. Each of these preparations will probably come to have its uses, to which, however, I have now only time thus generally to refer. Oleic acid is likewise a ready solvent of cantharidine and croton oil. It is itself aperient, and permeates fæces more readily than olive oil. Indeed, I fully anticipate that this acid, as well as its compounds with mercury and with morphia, besides other preparations made by its aid, will eventually be admitted into the Pharmacopœia. An ointment of the oleate of mercury would almost supersede the old-fashioned blue ointment, whilst the solutions of the oleates might replace the liniment of mercury. The remaining mercurial ointments of the Pharmacopœia, of which the nitrate may contain a little oleate or some allied salt, will, however, still have their special uses."

"The oleate must be prepared with the oxide precipitated by caustic potash or soda from a solution of the metal in nitric acid recently made and well dried. The solution of mercury by oleic acid is assisted by a temperature of 300° Fah."

"The 5 per cent. solution is a perfectly clear pale-yellow liquid, resembling olive oil, but thinner; the 10 per cent. solution is also fluid and perfectly clear, but as dark as linseed oil; whilst the 20 per cent. preparation is an opaque yellowish, unctuous substance, closely resembling in appearance resin ointment,

but not deeper or a scar will result. Each application
good deal of inflammation and pain; but the pain
allayed by covering the spot with collodion. Nayler
mercurial vapour bath in general eczema.

Mercurial preparations, especially black-wash, are
applications to syphilitic sores. Thus, mucous tub
yield to black-wash. Black-wash is useful too for th
indurations occurring at the anus of children, dif
mucous tubercles, being of much larger size, of irreg
often limited to one side, and generally extending
the rectum. This eruption, which may bleed and
ly each time a motion passes, often disappears but
the influence of mercury administered by the mo
in spite of it continue increasing slightly for mo
kept constantly moist with black-wash, its rem
assured in ten days or a fortnight. Black-wash
in other syphilitic sores.

When it is not convenient to apply black-wa
citrine ointment well rubbed in may be substitut

Calomel, dusted over syphilitic condylomata, ge
them.

Cyanide of mercury in solution, in the prop
fifteen grains to an ounce of water, is useful as
tion to syphilitic rashes and sores, as those of th
anus, penis, &c. For sores on the prepuce or g
solution of five grains to the ounce is generally
and even this strength sometimes excites a goo
ing. It should be well rubbed in with a camel
or at most twice a day, carefully avoiding t
healthy tissues. In case of chancres it is a g
this solution daily, and to keep the sore moist
in black-wash. Mercurial ointments rubbed in
penis are often apt to bring out a crop of ec
derable swelling.

Mercurial applications mixed with other
are very useful in syphilitic psoriasis.

Mr. Lee strongly recommends mercurial
treatment of syphilis, preferring calomel which
heat or moisture, and gives constant results.
fumigation; others maintain that the the
mercury are increased by steam. This mod

Most purgatives act more efficiently when given in frequent small doses, as every hour; but this does not hold with calomel. Moreover, according to my experience, we do not much increase the purgative effect by augmenting the size of the dose, a grain acting as energetically as five grains. Again, where a nightly purgative is needed calomel does not answer, for the dose adequate to produce four or five motions, the first night, will act only twice or three times the second, and often not at all the third.

The influence of mercury salts on the pancreatic and biliary secretion is still undecided. Seeing the influence of mercury on the salivary glands, some conceive it probable that it exerts a similar influence on the pancreas, a gland with a structure and a secretion very similar to those of the salivary glands.

Most opposite statements have been made concerning the action of mercury on the secretion of bile. From experiments on animals it has been concluded though not without dissentients that mercury in health diminishes the secretion of bile. In his report, as secretary of the Edinburgh Committee appointed to investigate this matter the late Dr. Hughes Bennett arrived at somewhat the same conclusion. This report states: (1.) That neither blue pill, calomel, nor corrosive sublimate, affect the bile unless they purge or impair the health, when the quantity of bile is diminished. (2.) That during an attack of dysentery, both the solid and fluid constituents of the bile are diminished. (3.) Purgation from any cause lessens the amount of bile and the proportion of its solid constituents. *See Podophyllum.*

Yet the experience of generations strongly supports the general conviction that in some diseases mercury does increase the bile. Moreover it is not difficult to conceive that in a given disease mercury may set aside some condition hindering the formation of bile, and thus act as a chologogue, though possibly in health it may even check this secretion.

When given to promote the secretion of bile, the common practice is to give a purgative dose for one or two nights; but if there is no constipation there is no need to purge, and a small dose, say one-sixth to one-half grain of grey powder twice or three times a day will answer better. The administration of small doses frequently is especially advantageous in cases where the illness is apt to recur frequently from slight and scarcely preventible causes, and where the frequent employment of purgative doses would favour after-constipation and produce depression and possibly salivation. For these reasons it is common to hear highly practical doctors decry mercurial preparations, whereas, were they to employ the minute doses now recommended they would obtain the desired effect and exclude the bad results they fear. Given in the doses just mentioned mercurial preparations in certain cases which I will indicate are signally useful:—

I. A patient voids pale clayey stools and suffers from acidity, flatulence, or vomiting, occurring sometimes only before breakfast. Half a grain of grey powder given three times a-day will often restore colour to the stools, when the dyspeptic symptoms cease at once.

II. Small doses of mercury yield excellent results in a form of diarrhœa common in children. The child's health is bad; the digestion is imperfect, generally with annoying flatulent distension; and three or four pale, clayey, pasty, stinking motions are passed in the day. A single grain of bichloride dissolved in half a pint of water, and a teaspoonful of this solution given each hour; or still better one-third of a grain of grey powder every hour or two hours, will in one or two days limit the number of the stools, and restore their natural bilious colour even though they have been clay-coloured for weeks.

III. Again, we frequently meet with a case like this:—A patient, generally of nervous temperament, on exposure to cold, or after fatigue or excitement, or even without any discoverable cause, feels sick, perhaps vomits, has a coated tongue, and in a few hours becomes jaundiced, the discoloration sometimes affecting only the conjunctiva, in other cases dyeing the skin of the whole body yellow. The stools are pale or colourless. The attack lasts three or four days and is accompanied by great depression. The patient may undergo many attacks, so frequently indeed that before the discoloration of one attack has passed away, another has begun to assail him. Here one-sixth or one-third of a grain of grey powder, taken at the very onset and repeated three or four times a day, allays the sickness, cuts short the illness, increases the intervals between the attacks, and after a time cures the patient, though he may have suffered thus for several years. If, however, there is obstinate constipation, a course of Carlsbad waters is then sometimes more efficacious.

IV. The same weak bichloride of mercury solution of a single grain in ten ounces of water in doses of a teaspoonful is very efficient in another serious form of diarrhœa, common in children. The characteristics of this form are very slimy stools, especially if mixed with blood, accompanied by pain and straining. The salient indication for employing the bichloride is the slimy character of the motions. Sometimes the slime is very tenacious, and, being coloured with blood, is described by the mother as "lumps of flesh." This affection may be acute, or it may be chronic, and last for months; but in either case the bichloride cures with remarkable speed and certainty.

V. A similar treatment relieves the dysentery, acute or chronic, of adults, provided the stools are slimy and bloody. A hundredth of a grain of the bichloride given hourly, or every two hours, according to the severity of the case, is generally sufficient, rarely failing to free the stools from blood and slime, although in some cases a diarrhœa of a different character may continue for a short time longer, requiring perhaps other treatment to control it.

VI. A sixth of a grain of grey powder given hourly is of great service in infantile cholera, characterized by incessant sickness, with profuse and almost continuous diarrhœa, very offensive and copious motions, watery, almost colourless, or of a dirty, muddy aspect. Under this treatment the vomiting generally soon ceases, and the diarrhœa shortly afterwards. Infantile cholera is an extremely fatal disease, running so rapid a course, that in a very brief space a child is reduced to a deathlike aspect and dangerous condition. It is essential then to check the diarrhœa as speedily as possible. In urgent cases a starch injection, with a minute quantity of laudanum, assists the action of grey powder.

VII. We often see in infants a chronic diarrhœa, characterized by watery, very offensive, muddy-looking, or green-coloured stools, often to the number of ten or twelve daily. This diarrhœa will generally yield to grey powder, in doses of a sixth of a grain, given at first hourly, and then every two or three hours, according to the frequency of the stools. Vomiting is an additional indication for this treatment. Although this drug may check the diarrhœa and vomiting, yet, if the disease has endured a long time, so serious may be the injury inflicted on the mucous membrane of the stomach, that food can neither be digested nor absorbed, and the child gradually wastes away. The appearance of thrush in the mouth is an unfavourable sign, as it generally indicates profound damage to the mucous membrane of the digestive canal. So also it is a bad sign always in the chronic diarrhœa of children, when the stools change in character from time to time—now watery, then slimy, at another time curdy, and at another green. It is far easier to cure a diarrhœa when the motions are always of a uniform character.

It is important to treat the severe forms of infantile diarrhœa promptly, for being generally inflammatory, the mucous membrane of the large, and even that of the small intestine, soon become seriously affected, the mucous membrane of the large intestine extensively ulcerated or considerably thickened and granular-looking, whilst the mucous membrane of the small intestine, a part of the tube less commonly affected, may be much softened. It will be readily understood that disease so extensive must take some time to cure.

Mercury, as we have seen, proves very serviceable in most of the forms of infantile diarrhœa, both acute and chronic. I have endeavoured to point out categorically the circumstances when one mercurial preparation is preferable to another. It may be urged that as in both severe acute, and chronic diarrhœa the same pathological conditions are found, that the same form of mercury suitable for one case would equally benefit another. But though the pathological state is held to be identical, still some hitherto undetected differences there must be, either in the nature of the disease itself or of the part it affects, for surely it requires a different pathological condition to produce in one case slimy stools, in another watery, and in another green curdy stools. These differences displayed in the symptoms, though at present not discriminated pathologically, require somewhat different treatment. Hence, though in each kind of diarrhœa, all forms of mercury are useful, it is found that in some cases bichloride of mercury is greatly to be preferred, and in other cases grey powder. In the treatment of chronic diarrhœa, mercurial preparations are often required for many days, and it frequently happens that though they alter the character, and lessen the frequency of the motions, yet the diarrhœa may persist and may require for its cure other remedies, like lime, arsenic, and nux vomica. In the treatment of chronic, as well as in that of acute diarrhœa, too much attention cannot be paid both to the quality and quantity of the food. Acute diarrhœa is often aggravated, and made chronic, by over-feeding; a short time after each meal, the child is violently purged, and the mother seeing it wasting rapidly, is apt to think, she can sustain her child by giving as much food as possible. But it must be borne in mind, that digestion is greatly impaired, so that but little food is digested; the excess lodging in the intestinal canal, undergoes decomposition and acting as an irritant, increases the disease. Not only should the quantity of food be small, but it should be given frequently in very small portions. It is also important to clothe the child warmly, and to put a flannel roller round the belly.

There is a form of diarrhœa in which the child passes large, acid, offensive, curdy stools evidently consisting of decomposing curds. Mercurial preparations, and, indeed the other usual remedies for diarrhœa are of little avail in this form of diarrhœa, which is best treated by withholding milk entirely and substituting animal food.

The chronic diarrhœa of adults, independent of serious organic change of the intestines, with watery, pale stools, often yields to the hundredth of a grain of corrosive sublimate every two or three hours. The same treatment answers sometimes in the diarrhœa of typhoid fever and phthisis.

With one-third of a grain of grey powder three or four times a day, a thickly-coated creamy tongue occurring in dyspepsia, in the course of chronic disease, or in early commencement of convalescence from an acute illness will generally rapidly get clean, with simultaneous improvement of the appetite and digestion and removal of disagreeable taste in the mouth. If there is constipation then it is better to give half a grain of calomel with three grains of extract of hyoscyamus repeated for three nights. The first pill generally purges twice or thrice, the second less, and the third not at all. Grey powder should be given if there is either diarrhœa or tendency to it, for, besides its effect on the tongue and stomach, it will generally control the diarrhœa at the same time restoring their natural colour to the motions, if too light or too dark.

With the exception of the sulphide, all mercury compounds enter the blood, and are employed in a variety of diseases on account of their action on distant organs.

Liegeois (*Gaz. des Hop.* 1869), states that small doses of corrosive sublimate increase the weight of healthy men and animals. Recora and Grassi say, that mercury diminishes the red corpuscles. On the other hand, Wilbouchewitch *(Archives de Phys.* 1874*)* found that in recent syphilis, small doses of mercury at first increase the number of red corpuscles and slightly diminish the white, and that if the mercury is continued beyond a certain point, it then lessens the red corpuscles, an indication to discontinue the drug. Dr. Keyes *(American Journal of the Medical Sciences,* Jan. 1876), points out that the doses given by Wilbouchewitch, were by no means small. Dr. Keyes has himself thoroughly and philosophically investigated this subject, and I subjoin the conclusions he arrives at.

1. That 5,000,000 red blood-corpuscles in the cubic m.m. is an average for healthy adult man. In anæmia the number rarely falls below 3,000,000. In fine conditions of physical health the number may reach 6,000,000.
2. Mercury when given in excess decreases the number of red corpuscles especially in hospital patients.
3. Syphilis diminishes the number of red corpuscles below the healthy standard.
4. Mercury in syphilis in small doses continued for a short or long time, alone or with iodide of potassium, increases the number of red corpuscles, and maintains this improvement.
5. Mercury in small doses acts as a tonic upon healthy animals, increasing their weight; but in larger doses it is debilitating.
6. Mercury in small doses is a tonic, for a time at least, to individuals in fair health and it increases the number of red corpuscles.

The prolonged and undue employment of mercury produces serious mischief, the body wastes, the blood becomes much impoverished, and "mercurial fever" may be induced, sometimes accompanied by pustular or vesicular eruptions. In mercurial tremors, weakness in the upper extremities is first noticed, then voluntary movements begin to lack their usual precision and soon slight tremors set in, and gradually increase in severity and extent till the whole body becomes affected, the legs being attacked before the trunk. These tremors are easily excited, cannot be controlled, and persist for some time. In severe cases, almost every part of the body is affected by severe spasmodic movements, so that respiration is spasmodic, and the sufferer may be unable to walk, talk, or masticate. Loss of memory, headache, delirium, and even convulsions, may occur. Salivation is sometimes absent; for the mode of poisoning greatly influences the effect of mercury, inhalation generally producing tremors, inunction producing salivation. Inunction, however, has produced tremors. Complete recovery generally takes place, provided the patient is removed from the influence of mercury before the disease has greatly advanced. The treatment of mercurial poisoning consists in the use of simple or sulphurous baths, and of iodide of potassium. The influence of iodide of potassium on mercury in the system has been spoken of elsewhere. (*Vide* Iodide of Potassium).

Mercury was formerly indiscriminately administered in all the forms and stages of syphilis. Given in enormous quantity, the constitutional effects sought to be produced were very serious. The bad effects undoubtedly resulting from the too free administration of this drug have led many to discontinue its use in syphilis, and even to attribute to the pernicious influence of mercury many of the more serious diseases, as destruction of the bone, etc., formerly met with in syphilitic patients. It has even been denied that these graver lesions are ever produced by syphilis.

There is much to countenance these views; for it is singular how similar the phenomena produced by mercury are to those which result from syphilis. It is fairly shown I think that the serious secondary and tertiary symptoms laid to the charge of mercury, can undoubtedly be produced both by it and by syphilis; so that these salts if given too freely, for too long a time, or under improper circumstances, inflict great harm by aggravating the disease they were intended to cure.

An influential though declining school of the present day maintain that mercury is powerless over syphilis, and that the drug is simply harmful; there is, however, a larger and more prevailing school firmly convinced of the usefulness of mercury when judiciously employed.

The believers in the efficacy of mercury hold generally :—

That it is good in both primary and secondary syphilis.

That it is of use in the treatment of the hard chancre only, and does harm in the soft chancre.

That by the aid of mercury the hard chancre is more speedily cured and the patient is less liable to secondary symptoms which when they do occur are milder in character.

That most forms of secondary syphilis yield quickly to mercury.

The following propositions are extracted from the admirable lectures by Mr. Jonathan Hutchinson to whom medical science is in so many ways indebted.

"That mercury is probably a true vital antidote against the syphilitic virus and that it is capable of bringing about a real cure.

"That in practice, a good many cases are really cured by mercury; the cure being proved by the restoration to good health, and in some cases by renewed susceptibility to contagion.

"That the probability of cure depends upon the stage of development, attained by the disease when the remedy is resorted to, and upon the perseverance, with which it is used.

"That in order to secure the antidotal efficacy of mercury against syphilis, it is desirable to introduce a considerable quantity into the system and to protract its use over a very long time.

"That ptyalism and other evidences of the physiological action of mercury, so far from being beneficial, are if possible to be carefully avoided, since they prevent the sufficiently prolonged use of the remedy.

"That in cases in which the patient shows an idiosyncrasy, peculiarly susceptible to mercury, the indication is to reduce the dose, rather than to omit the drug.

"That it is impossible to begin the administration of mercury too soon, and that it should be resorted to without loss of time, in all cases in which a chancre shows a tendency to indurate.

"That many cases of indurated chancre, treated early by mercury, never show any of the characteristic symptoms of the secondary stage.

"That in other cases of mercurial cure of the chancre, in which yet secondary symptoms do occur, they are usually milder, than if allowed to develope without specific treatment.

"That when mercury does not wholly abrogate the secondary stage, it exhibits a remarkable power in delaying it.

"That delayed outbreaks of secondary syphilis, are to be regarded, rather as proof that the administration had not been sufficiently persevering, than that the remedy was not efficient.

"That it is probable that the risk of tertiary symptoms, is in ratio with the severity and prolonged duration of the secondary stage.

"That there are some grounds for believing that the tertiary symptoms of syphilis, are both less frequent and less severe, in those who have been efficiently treated by mercury, than in others.

"That mercury cautiously given, does not in a great majority of cases do any injury to the general health, and that its local inconveniences may usually be prevented.

"That the doctrine of the real antidotal character of mercury in respect to syphilis, ought to lead to much more prolonged administration of it, with the hope of destroying utterly all lingering germs of the malady.

"That most collected statistics as to the duration of treatment and freedom from relapse, are misleading and worse than useless, because usually the treatment was far too short to be effectual.

"That it has not yet been proved that there are any special forms of syphilitic disease, in which mercury ought to be avoided, although as a rule it is acknowledged that it must be used with more caution in all forms which are attended with ulceration, than in others.

"That iodide of potassium possesses little or no efficacy against either the primary or secondary forms of syphilis.

"That the efficacy of mercury is often most signally proved in cases which have utterly resisted the action of iodide of potassium.

> "That it does not much matter whether the mercury is given by the mouth, by innunction, or by the vapour bath, provided that whatever method is selected, care is taken to avoid salivation, purging, &c.
>
> "That the doses usually resorted to for internal administration, are for the most part too large, and thus often necessitate a premature discontinuance of the remedy.
>
> "That if one method of administration does not proceed satisfactorily, another should be tried; and that in no case of difficulty should the vapour bath be forgotten."

Many other writers agree with Mr. Hutchinson. Dr. Keyes of New York recommends the unremitting use of mercury for at least two years, and sometimes longer in small doses, incapable of producing physiological effects. Dr. Keyes entertains the belief that syphilis can be eradicated.

Most of the forms of congenital syphilis of children, succumb to mercury with singular rapidity. It is a common practice to give to children small doses, as a quarter of a grain of grey powder, and to add to it a small portion of Dover's powder to prevent relaxation of the bowels. But I am convinced, that much larger doses of grey powder, are more beneficial, and remove the disease far more quickly and succeed indeed where the smaller dose fails. Thus one or even two grains of grey powder, may be given three times a day, unguarded with opium, for it is the rarest thing for even these doses to purge; nay, if any diarrhœa exists, a not uncommon complication, these doses check it. Moreover, they may be continued for a considerable time, till every symptom has vanished, without producing any of the toxic effects of the drug. As a rule, however, one grain of grey powder thrice daily is sufficient. Those comparatively rare forms of congenital disease, where the periosteum is affected, usually near the articulation of some of the long bones, yield best to iodide of potassium (see this drug), though as far as my experience goes, it is still necessary in most cases to resort to mercury, to remove the other evidences of syphilis.

While admitting the validity of these views, it is necessary to say that sometimes syphilitic patients are apparently completely cured without mercury, by mere general treatment tending to improve the health; and further, if the health is kept in good order, the secondary symptoms will be of a mild character. Cases of syphilis occur which are entirely uninfluenced by mercury, and are curable only by diligent attention to those hygienic circumstances which mend the general health.

When other means fail, mercurial fumigations with steam often cure certain obstinate syphilitic rashes.

The firmest believers in the efficacy of mercury in syphilis are unanimously agreed that to give it in quantities sufficient to produce salivation is not only undesirable, but pernicious; yet it appears that those preparations which salivate quickest, manifest the greatest power over the disease, and hence the metallic and mercurous preparations, as grey powder and calomel, are preferred by some to the mercuric, as corrosive sublimate.

To prevent or to mitigate an attack of sick headache, it is a common, and often successful practice, to take a mercurial purge, generally in the form of a blue pill. For further suggestions as to the employment of mercury in this troublesome affection, the reader is referred to the section on podophyllum.

It was formerly thought that mercury salts were endowed with the power of controlling inflammation, and to this end they were constantly given even to salivation; now, however, their use under such circumstances is much less general. Bichloride of mercury certainly appears to be of great use in iritis and inflammations of the deep-seated parts of the eye, and in other inflammations, especially of the serous membranes, it is probably of service, in checking the inflammation, and promoting the absorption of effused products.

According to very high authorities, among whom may be mentioned Dr. Parkes, small doses of calomel may be most beneficially given in typhoid fever. It should be given at the commencement; some think it useless after the ninth or tenth day. It is considered to lessen the height of the fever, to shorten its course, to render the intestinal derangement much milder, and to check the diarrhœa. Some push the medicine till the gums are slightly touched; but this practice, not only unnecessary, but harmful, should be carefully avoided.

There are some observations, in part made by Dr. Harley, which tend to show that corrosive sublimate is a "heart-poison;" for the heart of an animal destroyed by corrosive sublimate soon ceases to contract after death; and the heart of a frog suspended in a solution of this salt ceases to beat much sooner than a heart suspended in pure water.

Mercury remains a long time in the body, and may accumulate, so it is said, in globules in the cancellous structures of bone.

Mercury salts are to some extent eliminated by the urine, but chiefly by the mucous membrane of the intestines, and with the bile.

PREPARATIONS OF COPPER.

Applied to the unbroken skin, the soluble salts of copper produce no visible effect. They unite with the soluble albuminous substances on sores, forming an insoluble albuminate, which coats the surface, and, in an imperfect manner, may take the place of the lost cuticle. The thin pellicle thus formed protects the delicate structures from the air, and the substances floating in it, and so promotes the healing process. Like many other metals, these salts condense the structures and constringe the blood-vessels, and so lessen the supply of blood to the part and may even arrest hæmorrhage from the smaller vessels. They act as irritants to the delicate tissues, producing slight inflammation, with some smarting pain.

To arrest bleeding, and as an irritant to indolent sores, the sulphate is most employed, either in stick or solution, or as an ointment.

Indolent forms of impetigo, after resisting the more usual applications, will sometimes yield to sulphate of copper.

In tinea tarsi the solid sulphate may be rubbed, often with conspicuous advantage, along the edges of the eyelids, the eyelashes having been previously cut off closely and the scabs carefully removed. Indeed, in every case where slight stimulation is required, this salt may be used. Milder in its action than nitrate of silver, it excites much less pain.

The soluble salts combine in the mouth with the liquid albuminous substances of this cavity, and precipitate them more or less completely; but if used in quantity more than sufficient to do this, the mucous membrane itself is attacked in a manner altogether similar to the abraded skin. These salts possess a metallic styptic taste. The sulphate, in the solid form, may be applied with advantage to the spots of psoriasis simple or specific or to indolent sores, affecting the tongue. Painted in solution over the edges of the gums in ulcerative stomatitis it generally quickly heals the ulcerated surfaces; but, on the whole, dried alum is to be preferred.

A weak solution of this salt painted over the mucous membrane will remove the white, curdy-looking coating of thrush, and prevent its renewal.

The soluble salts in the stomach behave in the same manner as in the mouth, and if taken in large quantities act as powerful irritant poisons.

These salts are emetic; the sulphate being speedy, and mostly effectual, is not unfrequently prescribed. A good way to give this salt as a vomit is to administer it in small and frequently-repeated doses. It generally produces one copious evacuation, neither purging nor producing much nausea or prostration. It is supposed to exert an especial action on the larynx, hence it is sometimes given in croup, and when it is necessary to expel any obstructing substances from the glottis by the mechanical efforts of vomiting.

In moderate doses these salts are astringent to the mucous membrane of the intestines. The sulphate, administered either by the mouth or by injection into the rectum, is often effectual in staying severe chronic or acute diarrhœa, whether or not depending on serious organic disease.

Copper salts, taken for a considerable time in small quantities, are said to give rise to a condition not unlike that produced by lead: for example, colic, with alternating constipation and diarrhœa; and it is even said paralysis of the upper extremities, undistinguishable from that of lead.

Salts of copper find their way into the blood, existing there probably as albuminates.

Copper salts have been given in cholera and epilepsy.

Solutions of the sulphate are employed in gonorrhœa, gleet and leucorrhœa.

Copper is eliminated both by the urine and fæces.

PREPARATIONS OF ZINC.

THE members of this group are employed in various ways as external applications.

Their common action is astringent and irritant; but on account of their different degrees of solubility, their varying affinity for water, and perhaps for the tissues, the several members of this group manifest these properties in unequal degrees.

The chloride and iodide, from their high diffusion-power and great affinity for water, are the most energetic, yet even these remain almost inert on the skin, unless the cuticle is first removed, when they permeate the tissues, and destroy them for a considerable depth. The chloride at first produces a sensation of warmth, which increases to a burning pain, lasting seven or eight hours, by which time the tissues are destroyed, and a white eschar is formed, which separates in from seven to twelve days. The chloride and iodide, as we have just said, have hitherto been regarded as the most energetic salts of this series, but recently Mr. Marshall, of University College, has shown by experiments that the nitrate penetrates deeper than the chloride, destroying the tissues to a greater depth, and according to the same authority, possesses the further advantage of producing less pain than the chloride. These three preparations, but especially the chloride, are employed to nævi, warts, condylomata, the skin affected with lupus, and the tissue of syphilitic ulcers.

The sulphate having a lower diffusion-power, its action is much more superficial. In common with the other soluble salts of zinc, it forms an insoluble compound with albumen, and by virtue of its astringency condenses the tissues and contracts the blood-vessels. As a stimulant and astringent it lessens the secretion, and promotes healthier growth of ill-conditioned, free-secreting sores or eruptions. In common with the chloride it is used as an injection in gonorrhœa or gleet.

A grain, or two grains of chloride of zinc dissolved in a pint of water, and a little of this solution injected hourly during the day, is often useful in gonorrhœa, if treated at its very beginning, removing the disease in twenty-four to forty-eight hours. Rest, if possible, should be observed; but this is not indispensable. If the frequent injection causes any pain in the testicles, they should be suspended, and frequently fomented with hot water; if, notwithstanding, the pain continues and the swelling increases, the injection must be employed less often.

A solution so weak as the one recommended is no better it may be said, than simple water; but the fact is, simple water does not cure with anything like the same rapidity. If some of this solution is taken into the mouth, and retained there a few seconds, it will produce a decided roughness of the mucous membrane; now, if the solution is strong enough to affect the mucous membrane of the mouth, it can certainly influence, in at least an equal degree, a similar, but more sensitive, structure in the urethra.

The carbonate and oxide are insoluble, or but very slightly soluble, in the animal fluids; and as these salts possess no affinity for water, their action on the tissues is very weak. They are, however, slightly astringent, and are useful on account of this property, in ointment, or in powder. The ointment of the oxide is used as a mild stimulating application in eczema and impetigo, when, inflammation having subsided the raw surface is left in an indolent state, with very little disposition to heal. Both the oxide and carbonate are used as dusting powder, and are, perhaps, the best powders for this purpose; but as a rule, greasy applications are preferable. In inflamed conjunctiva, a weak solution of the sulphate dropped into the eye several times a day is often very useful. The same salt is occasionally employed as a gargle in relaxed sore throat, and is sometimes added to alum injections for leucorrhœa.

The more soluble preparations possess a metallic, styptic taste. None are employed in diseases of the mouth. The chloride has been used to destroy the exposed painful pulp of decayed teeth.

The carbonate in large doses produces some nausea and vomiting; but a full dose of the sulphate acts much more speedily, is a safe emetic, producing little prostration or nausea, and generally empties the stomach in one complete evacuation. It is therefore the best emetic in cases of poisoning, being far preferable to the slow and unsure action of ipecacuanha. It may be employed as an emetic in bronchitis or croup; in bronchitis, to expel the mucus from the bronchial tubes; in croup, the false membrane from the larynx; but other emetics are mostly preferred. The sulphate may be employed as an emetic, or in doses short of the induction of vomiting, in painful affections of the stomach, dependent on chronic inflammation of the mucous membrane. No satisfactory explanation has yet been given of the action of zinc salts as emetics. They vomit even if mixed with albumen. Injected into the blood, the sulphate excites vomiting.

On account of its slight solubility, the oxide exerts but slight action on the stomach, little being dissolved unless much acid is present.

Dr. Brackenridge strongly recommends oxide of zinc in two to four grain doses every three hours in the diarrhœa of children.

The chloride is a corrosive poison. The sulphate, on account of its astringency, like most other metallic salts, may be employed in diarrhœa. Its action must take effect on the upper part of the canal, since the portion escaping absorption must be speedily converted into an inert sulphide. The stomach may become habituated to the ingestion of very large doses of the sulphate, to the extent even of forty grains thrice daily, without obvious bad results, or without inducing either nausea or vomiting, or apparently any alteration in the mucous membrane of the digestive canal. As it has been shown that superficial ulceration of the stomach may be produced, the prolonged employment of such doses is imprudent.

Zinc colic has been described with symptoms including constipation, vomiting, prostration with disagreeable taste in the mouth.

Zinc finds its way into the blood, and exists there probably as an albuminate.

The oxide and sulphate have been employed with advantage in epilepsy, and whooping-cough. In bromide of potassium we now possess a better remedy for epilepsy.

Sulphate of zinc is often very useful in chorea. Like tartar-emetic, it succeeds best when given in doses sufficient to produce nausea, or even vomiting daily. To effect this, however, the dose must be rapidly increased sometimes to the extent of two grains every two hours daily, and it is astonishing how much of this drug can be borne, for I have given fifteen and sometimes twenty-two grains every two hours without producing nausea. Thus administered this salt often effects striking improvement, but these heroic doses after a time excite pain at the pit of the stomach with loss of appetite, and when this happens, another emetic, like tartar-emetic, may be substituted. When given to excite nausea, it is a good plan to administer a dose before breakfast.

It is a noteworthy fact that most emetics are useful in chorea. Do they act by exciting the physiological state of nausea, or by their operation on the nervous centres through which emetics produce nausea? As improvement occurs in many cases independently of the induction of nausea, the latter suggestion is probably the more feasible.

Zinc salts are reputed to be powerful "nervine tonics," a somewhat vague expression, meant I suppose, to imply that they promote the nutrition of the nervous system, and some authorities attribute to this property the influence of these salts in chorea. In certain forms of hysteria zinc salts prove useful, especially in the shape of the valerianate.

These substances are reputed to be antispasmodic. When they produce nausea, no doubt they indirectly act thus; but it is doubtful whether non-emetic doses are efficient antispasmodics.

The oxide in two to four-grain nightly doses often controls profuse colliquative sweating. It is said also to check the profuse secretion from the bronchial mucous membrane in some forms of bronchitis.

Dr. Hammond recommends oxide of zinc, in two to five-grain doses, for nervous headache.

This metal does not become fixed in the body, nor does it, like lead or mercury produce chronic affections. Zinc salts are eliminated from the body less rapidly than some other metals, passing out in small quantities only by the urine. It has been asserted that very little of the salts pass into the blood, which may be true; but the fact that the chief part may be re-obtained from the fæces is no proof of this statement, as zinc, like many other metals, is probably excreted by the mucous membrane of the intestines, and with the bile.

PREPARATIONS OF ANTIMONY.

Tartar-emetic, in the form of ointment, excites in the skin a characteristic inflammation, at first papular, then vesicular, and lastly pustular. The rash thus runs the course of the eruption of small-pox, and in each stage simulates it very closely, though there are points of difference distinguishable to a practised eye. Like small-pox eruption, this rash often scars; moreover, the capricious and painful action of this ointment renders it an unsuitable external application.

Tartar-emetic ointment has been used though now very rarely as a counter-irritant to obtain a powerful persistent action; for instance, to the scalp in tubercular meningitis.

Chloride of antimony is a powerful escharotic, but it produces an ill-conditioned, slow-healing sore.

Tartar-emetic being the most used member of this group, our remarks, except when the contrary is stated will apply to this preparation.

Antimony preparations it need hardly be stated are not used as topical applications to the mouth. After small medicinal doses the stomach experiences a slight sensation of soreness—a sensation easily mistaken for hunger. Pushed yet further, the drug produces increased secretion of mucus from the stomach and intestines to the extent of inducing numerous moist motions; and diarrhœa with colic may set in. The bronchial mucous membrane also yields an increased secretion, and probably the secretion of the whole mucous tract is augmented.

Antimony is never used as a purgative; in fact, opium is frequently given in combination with tartar-emetic, expressly to prevent purgation. Large doses excite nausea and vomiting. As an emetic, tartarized antimony produces considerable depression, with much nausea in a greater degree than most other emetics; and the repeated vomiting is accompanied by great straining. Its action is somewhat tardy, sometimes twenty minutes to half an hour, hence in cases of poisoning it is an unsuitable emetic.

Majendie has shown that when injected into the veins tartar-emetic excites nausea even after the removal of the stomach and its substitution by a pig's bladder; hence it has generally been held that this salt produces vomiting, not by its effects on the stomach, but on the nervous centres. Grimm who is confirmed by Kleimann and Simonowitsch, finds that when injected into a vein, it excites vomiting more slowly and a larger dose is required, than when administered by the stomach, whence he concludes that it produces vomiting by its effects on the terminations of the nerves of the stomach. He disposes of the difficulty raised against this view by Magendie's experiment, by assuming that tartar-emetic excites nausea, by its effects on the termination of the nerves of the œsophagus and intestines. Other observers explain the foregoing facts by the supposition that tartar-emetic acts both through the terminations of the nerves of the stomach and directly on the centre for vomiting.

Tartar-emetic was formerly employed to induce muscular weakness and relaxation of spasm, to facilitate the reductions of dislocations and hernia, but in such cases chloroform has now completely superseded it.

Trousseau taught that food influences greatly the action of this medicine, a low diet favouring the production of its constitutional effects, and a full diet its emetic and purgative effects. Its action is further modified by the quantity of water administered with it; this being small, vomiting takes place, if large, diarrhœa is produced. Trousseau further observed that certain substances modify the effects of antimony; for wine and acid fruits, both fresh and preserved, develope its emetic and purgative properties.

The soluble antimony compounds easily enter the blood, but the form they assume there is unknown. Possibly the oxide of the metal, either in the stomach, intestines, or blood, combines with albumen, forming an albuminate. Antimony compounds, it is said, do not combine with albumen, except in acid solutions, when an insoluble compound is formed.

It has been proved experimentally that the administration of tartar-emetic increases both the insensible perspiration and the vapour from the lungs, but chiefly the secretion from the skin; and since at the stage of nausea all emetics increase the sweat, it is difficult at present to decide whether tartar emetic has in this respect any special influence. Tartar-emetic wine is commonly given as a diaphoretic in fevers.

Under the influence of tartar-emetic, carbonic acid and urea are both eliminated in greatly increased quantity. Whether the antimony is to be considered a mere eliminator of these excrementitious substances, or whether it likewise increases their formation, is not determined, as the experimental evidence is as yet inadequate to decide this question.

In common with other emetics, antimony is sometimes given in large doses to produce profuse nausea and vomiting, and many eminent authorities, among whom ranks Dr. Graves, hold that the strong impression thus made on the system will cut short acute specific fevers and inflammations. Graves held that typhus might be thus summarily checked. The period for the exhibition of emetics, he states, is very short; for they will not succeed after the lapse of twenty-four or thirty-six hours from the occurrence of the rigor.

Many cases of ague may be cured by the impression emetics make on the system. An emetic administered each morning will help the action of quinine, for cases, rebellious to quinine alone, often yield immediately to the joint action of quinine and emetics. Ipecacuanha and other emetics should be preferred to antimony.

Antimony will not lower the temperature of the body of a healthy person, if one experiment may be accepted as sufficient to settle this point. To a strong young man I gave tartar-emetic in half-grain doses every ten minutes for nearly seven hours, inducing great nausea and vomiting, with profuse perspiration; but during the whole time his temperature remained remarkably constant, varying not more than 0·4 Fahr., an amount of deviation frequently observed in health.

Of late years, antimony has been much employed in acute pneumonia, and the general experience of the profession is strong in its favour. Discretion, however, must be used in adapting the dose to the strength of the patient, who, if weak, must meanwhile take alcoholic stimulants. Under the influence of antimony, the pain in the side gives way, the expectoration from rusty changes to bronchitic, the pulse and breathing become reduced in frequency, and in many cases the further spread of the inflammation is checked.

Other kinds of acute inflammation may be similarly treated, although the good results are not so apparent as in pneumonia. Unless the tartar-emetic is given at the very beginning, its power to control pneumonia is much less marked. In inflammation, one-fourth to one-half grain may be given every two or three hours, or a lesser proportionate dose every hour.

Antimony will shorten and render more mild, attacks of tonsillitis, pleurisy, orchitis, bronchitis, puerperal peritonitis, inflammation of the breast, whitlow, and other inflammatory affections, and it may also be employed with considerable success in chronic bronchitis, when the expectoration is copious, frothy, and difficult to expel.

In the following disease tartar-emetic is invaluable :—

A child six to twelve years old, on the slightest exposure to cold, is attacked with much wheezing and some difficulty of breathing, sometimes so urgent as to compel him to sit all night propped with pillows. The expectoration may be pretty abundant, but a child of this age does not generally expectorate. On listening to the chest, there is heard much sonorous and sibilant, with perhaps a little bubbling, rhonchus; but this last is often absent. The wheezing is audible for a considerable distance, and sometimes the noise is so great as to be heard many rooms off. Occasionally the cough is troublesome, and on each exposure to cold the voice may become hoarse, and the cough hollow and barking. Some children become thus afflicted whenever the weather is cold, even in summer, and may not be free the whole winter; with others the attack lasts only a few weeks or days. This affection sometimes follows measles. It is compared by the mother to asthma, with which, if not identical, it is certainly allied.

The best way to administer this salt is to dissolve a grain of it in half a pint of water and to give a tea-spoonful of the solution every quarter of an hour for the first hour, afterwards hourly. If the wheezing comes on at night, it is sufficient to give the medicine at this time only. The good effects of the medicine become speedily evident; for on the very first night it often benefits greatly the child. So small a dose, it may be thought, must be inefficacious, but when first given it generally produces vomiting once or twice in the day, and as it is not necessary to produce sickness, the dose in this case must be still smaller.

There is, however, an affection unaffected by tartar-emetic, somewhat similar to that just described, which it is necessary to discriminate from it. It occurs in children a few months old, and consists of a loud rattling, which is obviously caused by mucus in the throat or larynx. In some cases the rattling is worse in the day, but is usually worse at night. There is no bronchitis, or, if it exists, this is a mere coincidence; nay, sometimes on the occurrence of bronchitis the complaint in question ceases for a time. It is brought on and aggravated by cold, and may last, with some fluctuations, many months.

Antimony in small hourly doses is very useful in the acute catarrh of children, sometimes accompanied by vomiting and diarrhœa, probably due to catarrh of the intestines. The intestinal canal is sometimes the first attacked, but most frequently the lungs are first implicated. The tartar-emetic generally quickly stays the vomiting and diarrhœa, but often takes a longer time to control the bronchitis.

Antimony acts as a depressant on the heart partly through its nauseating influence weakening and increasing the frequency of the contractions.

Graves employed antimony in typhus and other fevers, when there is much excitement and furious delirium, symptoms which are generally subdued by the exhibition of this drug. As wakefulness is a concomitant symptom, being indeed the cause of the excitement and delirium, opium should be added to the antimony. The combined influence of these remedies calms the excitement, and induces refreshing sleep, out of which the patient wakes refreshed and free from delusions. Judiciously employed, these remedies may save an almost hopeless life. Each drug appears to assist the action of the other; and the relative doses must be determined by the circumstances of the case. In furious delirium the tartar-emetic must be given in full, and the opium in small quantities; while, if wakefulness predominates with not very boisterous delirium, the dose of tartar-emetic must be reduced, and the opium increased.

Graves advises one-fourth to one-half a grain of the salt every hour or two hours to be discontinued when it produces bilious stools. This treatment is very useful in the delirium which usually sets in about the ninth or tenth day of typhus.

The mania and sleeplessness of delirium tremens generally gives way to the same treatment.

Puerperal mania may be treated in the same way, although probably bromide of potassium and chloral give better results.

Tartar-emetic given to the extent of producing nausea and vomiting once or twice a day is sometimes useful in chorea. (See sulphate of zinc). Increasing doses must be given, as the system appears soon to tolerate it. Other remedies, however, are more efficient.

In strumous ophthalmia, tartar-emetic may be given with advantage, in doses of 1-36th to 1-48th of a grain, three or four times a day. Sharp purgation at the commencement of the treatment is highly useful.

In acute poisoning by tartar-emetic, violent and continuous vomiting occurs, accompanied with a diarrhœa of bilious and bloody stools, and sometimes the common symptoms of gastro-enteritis, and sometimes of peritonitis, are present. The prostration is intense, and profound and repeated faintings take place. The respirations and the pulse are said to be reduced both in frequency and in strength; others assert that the pulse is more frequent.

The *post-mortem* appearances are, inflammation of the stomach and intestines, but not often of the gullet. The peritoneum may be, and, according to Harley, the rectum often is, inflamed, and some inflammation of the lungs is usually observable, tending to make it probable that tartar emetic exerts an especial action on these organs.

In the treatment of poisoning by tartar emetic, the vomiting should be promoted by warm demulcent drinks, while strong tea or coffee, tannin, or decoction of oak bark, should be diligently administered.

The statements concerning the influence of antimony on the urine are conflicting. The probable effect of tartar emetic on this excretion is to lessen the amount of water and of chloride of sodium, owing to increased perspiration. The urea is greatly increased, apparently in proportion to the dose of the antimony, so is the pigment and uric acid, but in a less degree.

The golden sulphuret increases all the constituents of the urine, especially the urea and sulphuric acid (Parkes *on Urine*).

Antimony is separated chiefly by the kidneys; some however, passes with the bile, and perhaps by the intestines. A portion is retained in the body.

PREPARATIONS OF ARSENIC.

SINCE all arsenic salts produce the same symptoms, it is probable that in the blood they ultimately assume the same form.

Dry arsenious acid produces no changes in the unbroken skin, but in wounds or sores it excites very active inflammation, sufficient, if the application is a strong one, to destroy the tissues for some depth. Arsenious acid has long been used to destroy warts, condylomata, cancerous growths, the nerve of a carious tooth, &c.

It may be applied pure, or mixed in variable quantities with some bland powder, as starch. At times this application has enjoyed a high reputation, whilst at other times it has fallen into almost complete disuse. Some have fallen victims to this treatment, it is said, through the absorption of arsenic in sufficient quantity to destroy life, but an untoward result like this can occur only when certain well-known precautions are disregarded. Absorption can be effectually prevented if sufficient arsenic is employed to excite active inflammation; for inflamed tissue loses the power of absorption more or less completely. Produce active inflammation, and the patient is safe; but if through fear of poisoning, too little arsenic is used, that is th most efficacious way of doing what it is desired to avoid. Surgeons, experienced in the employment of arsenic, recommen that if the tissues to be destroyed are extensive, the arseni should be applied to a part only of the surface at a time. Whe employed to remove large growths like cancer, the skin bein unbroken, incisions are first made, and into these the arsenica paste is laid, which soon stirs up active and deep-seated inflammation, and the growth dies for a considerable depth. Th whole tumour often sloughs away from the healthy tissues—i in fact enucleated—leaving a clean and healthy sore, whic heals without trouble in fifteen to thirty days.

Lupus and other obstinate skin affections may be treated in the same way.

Arsenious acid and powdered acacia, of each an ounce, blended with five fluid drachms of water, form an arsenical mucilage much used by Dr. Marsden to remove epitheliomatous growths. Some of this arsenical mucilage is to be painted over the tumour night and morning, taking great care to limit its employment to the diseased tissues. Each application, covering not more than a square inch, is to be several times repeated, and the separation of the sloughs aided by poulticing.

The following powder may also be used:—Fresh lime, half an ounce; yellow sulphide of arsenic, 20 grains; starch, 180 grains. The arsenic should constitute one-fifth or one-sixth part of the arsenical powder, so as to insure the excitation of sufficient inflammation to prevent poisonous absorption. This powder may be also cautiously used as a depilatory.

Liquor arsenicalis painted over warts is said to cause them to disappear, and a limited experience leads me to believe that the arsenic does appear to disintegrate the wart, so that pieces of it drop off, or can be picked out. If very large, it must first be dissolved away with strong nitric acid, to allow the liquor arsenicalis to come in contact with the softer tissues below. It has appeared to me to be also a useful application to corns.

An arsenical bath is useful in some forms of rheumatoid arthritis. It is made by adding to the water in an ordinary general bath four ounces of common washing soda and twenty grains of arseniate of soda.

Arsenic has a sweetish taste. In moderate doses it apparently neither undergoes nor produces any changes in the mouth.

Dentists employ it as an escharotic to destroy the exposed sensitive pulp of decayed teeth, or to destroy the pulp before stopping the tooth. If used to quell pain, the arsenic may be mixed with opium; it sometimes at first aggravates the pain.

We see chiefly in children and occasionally in adults a circular rash on the tongue, which begins at a point, then enlarges and separate rings may coalesce. Sometimes the edges are not raised, and the patch looks as if due merely to separation of epithelium, leaving the surface unduly clean and smooth; in other cases the edges are raised, and have a gelatinous aspect. This affection is often very obstinate, frequently recurring, and is generally connected with stomach or intestinal disturbance; some cases being always associated with diarrhœa. Other cases are associated with a rash over the body like lichen urticatus. In this affection of the tongue, arsenic has appeared to me to be useful.

The vapour of arsenical cigarrettes drawn into the lungs is sometimes useful to prevent or to lessen attacks of asthma. Care, of course, must be exercised in their manufacture. Trousseau advised the smoking of cigarrettes made of paper "saturated with a solution containing half a drachm or a drachm of arsenite of soda in three drachms of water. Such inhalations, we should suppose, might be mischievous, unless closely watched." (Stillé).

These cigarrettes may be used in chronic phthisis.

Arsenic given in medicinal doses is very effective in sloughing of the mouth or throat, malignant sores, as cancrum oris, malignant sore throat, and the like. It is also useful in chronic coryza.

There are certain curious complaints of the respiratory tract more or less allied to asthma, which I will now refer to. In these cases of quasi-asthma a dose of one, two or three drops of the solution of arsenic three times a day often proves serviceable.

I. A patient is seized perhaps, daily, or even several times a day, generally in the morning directly on rising or soon after, with an attack of persistent sneezing, with profuse running from the eyes and nose, accompanied sometimes with severe frontal headache. Each attack may last several hours. Several days sometimes elapse before the recurrence of an attack which is then usually severe, lasting twenty-four hours or even longer. The sneezing is generally accompanied, and sometimes preceded, by itching at a small spot situated inside one or both nostrils, not far from the orifice, but in some cases the itching affects the whole of the inside and outside of the nose, extending even to the face. These attacks are excited by exposure to cold, by dust, and sometimes from unascertainable causes. The disease may endure for years.

II. We occasionally meet with cases, apparently identical with that just described, but with this difference—the attack is excited by food, is most severe after the larger meal, and lasts from twenty to forty minutes. One patient felt itching in the nose, throat and ears in distinctly periodic monthly attacks, worse in summer. This attack was brought on by food, but a chill sometimes brought on a paroxysm.

III. Arsenic is invaluable too in another more developed and severer form. We not seldom find a patient, prone to catch cold, attacked with severe and repeated fits of sneezing, accompanied with profuse, clear nasal discharge and severe frontal headache. Each attack, generally worse in the morning, lasts a few days; but, owing to the great susceptibility to cold, it frequently recurs. Severe itching of the ala of one or both nostrils often fore-warns the patient of an approaching attack. A simple irritant like dust may be adequate to excite a paroxysm. Continuing in this form for some time, occasionally for years, the affection may then extend from the nose along the throat to the lungs, producing sore throat, soon followed by much difficulty of breathing, great wheezing, and free expectoration. The lung affection may last for some weeks. When this severe form has become established, the lungs may be attacked without any preliminary affection of the nose or throat.

IV. Again, among children, we not uncommonly meet with a similar and perhaps identical disease. A child perhaps six months old undergoes a severe attack of bronchitis and thenceforth becomes very prone to catch cold. Then on catching cold, he is seized with frequent and incessant sneezing, lasting a variable time, sometimes a few hours, sometimes three or four days, and resulting in bronchitis, accompanied by much fever, wheezing and great embarrassment of breathing, severe enough even to compel the patient to sit up in bed. The coryza may sometimes precede the dyspnœa three or four days, the shortness of breath continuing for many days or even weeks after the cessation of the coryza. It is, indeed, a form of asthma. The child encounters many attacks in the year, especially during the winter, and may continue liable to them for years, and then perhaps lose them, or they may engender life-long asthma.

V. Or we meet with cases like the following:—A patient suffers from asthma for several years and then is seized with severe attacks of sneezing. These attacks, strange to say, may not occur coincidently with the paroxysm of dyspnœa, the sneezing takes place in the morning on rising, whilst the difficulty in breathing comes on in the afternoon, or at night.

These cases appear related on the one hand to bronchitic and dyspeptic asthma, and on the one hand to hay fever. They are allied to the bronchitic form of asthma, being excited by dust, cold, and direct irritants; and to bronchitic asthma through those cases where the paroxysmal coryza is always accompanied by bronchial asthma; and again to bronchitic asthma through those cases commencing as paroxysmal coryza, the disease extending and becoming complicated with bronchial asthma, or *vice versâ*. To the peptic forms of asthma this paroxysmal sneezing is related through those cases where the attack is excited by food; and those where the patient, a confirmed asthmatic for many years, then becomes afflicted with paroxysmal coryza, induced by food, the asthma at last ceasing, the coryza alone remaining. This typical case further illustrates the connection between paroxysmal sneezing and dyspeptic asthma; a child since six months old is subject to attacks occurring every few months, most common in winter, beginning with not very severe sneezing, lasting from a day to a week, often, but not invariably followed by an attack of bronchitis, with much difficulty of breathing and fever. Even when free from an attack, the child, after a full meal, suffers from stuffy breathing.

The following cases occurring in the course of four generations in the same family show the intimate connection between intermittent sneezing and asthma, for asthma was followed in the grandson by hay-asthma, and he begot an asthmatic child who suffers all the year round from severe attacks of itching and sneezing, not due to pollen as was the case with his father; one patient showing that even hay-asthma may be influenced by climate, whilst his son especially exemplified the intimate connection between intermittent sneezing and asthma, for in his case both co-existed and both were peptic in kind, being each greatly and mainly influenced by diet, and in the case of his father also by climate.

Mr. H., Aged 35. His grandfather was asthmatic for years dying close upon 80 years of age. Mr. H. himself suffered from hay-asthma from babyhood. The attacks occur only in the spring during the hay season, and last six weeks. If he goes into a hay field, nay, near one, he is stricken immediately with a severe attack of intense itching of the whole inside of the nose, and of the entire conjunctiva, of both eyes, (though not over the frontal sinus), and of the throat accompanied by violent sneezing and profuse discharge from eyes and nose. His eyes become bloodshot and the lids swell sometimes to such an extent that he can scarcely see. His breathing is very difficult and without expectoration. So intensely susceptible is he, that a field a great distance off will affect him; nay, if his children play in a hay field, and then come indoors, he will have an attack. Other flowers besides grass or roses, &c., at this time will bring on a mild attack, but at no other time of the year. Strong sunlight also induces them unless protected by large dark glassed spectacles. *Strange to say, that whilst severely affected in Sussex his native county, he is quite free, in Windermere, in Scotland, and in Devonshire, even though the grass is in full bloom.* Thus, on one occasion when suffering from a severe attack, he started for Linton in North Devon, and after leaving Barnstable, he began to improve more and more, and while at Linton he was quite free, though the house he lived in was close to a grass field in full blossom. On one occasion whilst yachting in St. George's Channel, but not till the fourth day from land, he was seized with a severe attack. For the last four years he has inhaled quinine spray through his nose with marked benefit. His sister 24 years old, has had hay-asthma for the last four years. His son aged 10, has suffered from severe asthma since a sharp attack of bronchitis when three years old. He suffers all the year round almost continuously from severe itching inside the nose, in the eyes, throat, ears, and under the chin. When these symptoms are aggravated he has severe sneezing with rather free discharge of clear fluid from his nose. Any kind of dust aggravates his symptoms, but not especially pollen. He suffers also from wheezing, and when the itching and sneezing are aggravated, from much difficulty of breathing and violent cough.

All these symptoms are very greatly influenced by food, thus the itching, &c., and the dyspnœa are always aggravated by pastry, sweets, and especially by a heavy meal taken in the evening or late at night. He has been much worse since an attack of measles three months ago, and subsequently, any food even bread and butter increase both the itching and the difficulty of breathing. He does not easily catch cold at Brighton, where he is always free from all his troubles, and on one visit to Linton, he lost all his symptoms during his sojourn there. His stomach has lately been very delicate so that he vomits very readily. He is very flat chested and round shouldered, he wheezes loudly, and his expiration is very greatly prolonged.

The following interesting and instructive family history throws much light on the affinities of these curious complaints. A woman when young suffered from bronchial asthma, which left her for some years, and then she became affected with hay asthma. She bore two sons. One aged nineteen has suffered for two years every morning during the summer from violent attacks of sneezing, and profuse watery discharge. These attacks are not excited by hay nor the smell of flowers.

Another son aged thirty has been subject to asthma and bronchitis since five years of age. It began and for a long time continued of the same character as that so often seen in the commencement of asthma, especially in young children, beginning by an attack of cold in the head with fever, lasting about three days, followed by about nine days of asthma. (*See Aconite*).

The bronchial asthma of the mother was most severe in the winter. From this she quite recovered, and remained well for several years; but during the last ten years, she has suffered from well marked hay-asthma, the attacks being apparently solely due to hay.

Her son aged 19, for two years, has suffered from violent attacks of sneezing and much running from the nose, the paroxysm lasting sometimes for hours. They are accompanied by much itching of the whole inside of the nose. There is no dyspnœa or wheezing. These attacks occur chiefly in the morning directly he gets up, but they may seize him at any hour of the day. He can go into a hay field, or smell flowers without producing the slightest trace of an attack. They are brought on by dust and strong sunlight; these being the only causes he has detected, but he cannot account for those attacks beginning directly he gets out of bed. The complaint lasts the whole summer, leaving him in the winter. The attacks are not affected by food.

His brother aged 30, has suffered from bronchitis and asthma since five years old. At first the attacks began with cold in the head and fever without much sneezing. This stage lasted about three days, then his throat became slightly sore, and next bronchitis set in. To use his own words, he had generally three days cold in the head, and nine days asthma, though sometimes the asthma lasted much longer, indeed, sometimes continuing for months. As he has grown older, the attacks have undergone considerable modification. The chest symptoms begin with cold in the head, or may occur without it. He is obliged to take the greatest care, for the slightest draught or chill brings on an attack. Strange to say, conditions which at one time induce an attack are inoperative at another. Thus, he can sometimes join a hay party without being affected, yet at other times going into a stable, or passing a hay cart, not to mention going into a hay field brings on a violent attack. Dust, as house dust, builder's dust, excite an attack; so does strong sunlight and flowers. An attack induced by any of these agents, consists in itching of the nose, violent sneezing with profuse discharge from eyes and nose, the itching and discharge being usually most marked in the left nostril, though sometimes the right nostril is implicated. In addition he suffers fron dyspnœa. The coryzal symptoms always occur in the day, the dyspnœa at night. When troubled with asthma, the dyspnœa is considerably aggravated by food, which, however, at any other time does not produce any tightness of the breath.

Strong black coffee, even the smell of it, immediately relieves the dyspnœa, but is without effect on his coryza.

The fumes from Himrod's powder wonderfully relieve both the coryza and dyspnœa. All inhalations with the foregoing exception "tighten him up everywhere even in his nose and throat."

In some cases of sneezing with its complications it appears to be limited to the nasal part of the fifth nerve or even to a very limited portion of it. In other cases after continuing in this form for some time, the throat branches of the fifth may become involved, and subsequently the vagus; or *vice versâ*, beginning at the vagus it may involve the fifth; and in either case the disease may quit the nerve originally affected, an incident most common when the attack first affects the fifth nerve. Indeed, in my experience this is not an unusual way for asthma to begin in children; and as they grow up the coryzal symptoms cease, and ordinary bronchitic asthma alone remains.

On the other hand, these cases of paroxysmal coryza are related to hay asthma, which indeed appears to be the same disease, but, owing to the patient's idiosyncrasy, the attack is induced only by the pollen of plants; the similarity between these affections being shown by the fact, that in each the mischief may be limited to the nose, frontal sinuses, and eyes, or extending further, may involve the lungs.

Mr. Blackley, in an admirable paper, shows, that in his own case, and in some other instances, hay asthma is solely due to the irritant effects of the pollen of plants. He conducted an extensive series of experiments with the pollen of many grasses, cereals, &c., and found that all are capable of exciting an attack, although some kinds of pollen are more active than others. The pollen of poisonous plants is not more virulent than that of harmless plants, indeed, he finds that pollen of solanaceous plants will excite a slight fit, while the pollen of wheat excites a very severe attack. In his own person and in some other cases he clearly shows that all the agents hitherto supposed to be severally productive of asthma as ozone, heat, strong sunlight, the volatile principle on which the odour of plants depends, oleo-resins, dust, unless it contains pollen are powerless to produce a paroxysm. In other cases it appears that one or more kinds of pollen only will produce the attack. Thus, rose-pollen excites the attack only in some patients; and it is said that in America, Roman wormwood is a frequent cause. Hay asthma and the diseases just described are indeed identical, but owing to individual idiosyncrasy, the attack is induced in one person by one irritant and in another by a different irritant. In some cases the attack as we have seen is induced by pollen, in other cases by ipecacuanha or by animal emanations, as from rabbits, cats, horses, the smell of mustard, feathers or a privet hedge, &c. Dr. W. Smith, of Preston, narrates a case in which a linseed poultice provoked the symptoms of hay asthma. Simple dust will occasionally excite these symptoms, and sometimes one kind of dust only.

Thus a middle-aged man, an ironmonger, had suffered from paroxysmal coryza and asthma for two years, the attacks being brought on only by the dust of his shop; whilst other kinds of dust, as that of a road, failed to affect him, nor did flowers, grasses, &c., nor sun-light. This case was singular in this respect, that whilst only the dust of his shop excited coryza and asthma, yet in certain localities he suffered at night from simple asthma without coryza. Notwithstanding Mr. Blackley's careful and elaborate experiments, I cannot help believing that sun-light and great heat will in some persons bring on an attack without the intervention of pollen. It is well known of course that strong sun-light and great heat will much aggravate the attack induced by pollen.

The itching and tingling which generally accompany paroxysmal sneezing, no matter what their exciting cause, may affect the whole or any part of the nose. Sometimes the tingling and itching are felt near the orifice, or inside under the bridge, and may extend to the cheek or to the eyes, now and then only to the inner canthus, and may be limited to this part, or they may affect also the palate or throat. I remember the coryza in one case was accompanied and probably excited by itching of the nose and soft palate, and that iodine inhalations at once removed the coryza and nasal itching, but left unaffected the itching of the palate, which ceased at once on the application of a little nitrate of silver.

It is interesting to observe the very different degrees of development of the disease. In certain cases the attack appears to be limited to paroxysmal severe itching of the inner canthus in some seasons. In other cases even of true "hay fever" the irritant excites only this itching of the inner canthus; though at other times it also excites paroxysmal sneezing; or the attack may at first be limited to the itching, but as it goes on, sneezing and profuse watery discharge are superadded. In other instances besides the itching and sneezing the patient suffers from bronchitis and dyspnœa. In another group of cases the irritant only excites bronchitis and dyspnœa. In yet another set of cases a patient has violent attacks of sneezing, generally occuring in the morning without any itching; and in one instance a lady had each morning profuse watery discharge literally running from her nose, lasting half an hour without itching or sneezing, this discharge always ceasing immediately her bowels were relieved.

This itching generally yields to iodine inhalation even when fails to arrest the paroxysmal sneezing.

This affection may be likened to neuralgia of the branches the fifth supplying the inside of the nose, but instead of pai there is intense tingling or itching which induces violent sneezing and profuse discharge. As in the case of a neuralgia, w can imagine the affection in question to depend on (1) an excitable condition of the termination of the nerve, (2) of it trunk, or (3) of part of its centre. In the first category a normal stimulation produces a very powerful effect on the terminations of the nerve; in the second, a natural impression becomes intensified in its passage along the nerve; in the third, it becomes intensified on reaching the excitable nucleus (see remarks on neuralgia in section treating on counter-irritation), and the resulting urgent tingling induces sneezing, and the accompanying phenomena. It is also conceivable that in certain cases the fault lies in the centre for sneezing, this being in an excitable state, so that a normal stimulation of the nasal branches of the fifth induce violent sneezing. It is often difficult to decide where the fault lies, whether in the termination of the fifth, its trunk, or its nucleus, or in the centre for sneezing. When the attack is provoked by pollen dust, smoke, animal emanations, or the smell of a linseed poultice, it is impossible to localize the seat of the disease, but sometimes this must be in the central nervous system itself, as the following case illustrates.

Mrs. M., æt. 32, has suffered from attacks of sneezing for three years. These attacks occur at intervals all the year round, but are worse in winter and are brought on chiefly by cold air or a draught. Directly she gets out of bed, whether in the middle of the night or in the morning, then on comes the attack and lasts two or three hours. The least draught will bring it on at any time of the day. Dust or smoke induces an attack, and the dust on sweeping her room brings on a violent fit. Strong sunlight, or certain flowers, as lilies induce a milder attack, very slight compared to one caused by dust. Excitement, fatigue or worry bring on an attack. The sneezing is very violent and almost incessant; the discharge from the nose chiefly from the right nostril is profuse, and her eyes run copiously. The attack is always accompanied by intense "tickling" of the whole inside of her nose, much more severe in the right nostril, and always commences on that side. The itching extends to the inner part of her eyes, but is not felt in the eyelids. She has the same tickling, but slighter on the right side of the fauces and extending to the right ear, with a sensation of cold water in the ear. During an attack she has a sensation of constriction, but only on the right side of the chest. Brushing or combing, or pulling out a hair just above the right frontal eminence, or especially picking a pimple on the portion of the forehead just below this, brings on "a dreadful pricking se sation," extending over an area about two inches in diameter, involving the right side of the forehead, and the adjacent scalp, on which the hair is getting grey. This pricking over the area always brings on a severe attack of sneezing, with all the concomitant symptoms. On the other hand, attacks induced by smoke or dust, also produce this pricking sensation in the forehead, but to a less degree. Sight, hearing and taste are unaffected. There is some periodicity in her illness, thus for two or three weeks she will be better, and will then relapse. There is no hereditary tendency to any neurosis, and no instance of asthma in her family.

A strong mental impression will arrest the attack, as a fright about her children. The paroxysms are not worse during the menstrual period. During pregnancy she is quite well especially after quickening, when she grows much stronger, but after suckling she very soon becomes weak, and then the attacks return. They are not influenced by food.

Once when at Brighton for a week, she was entirely free from attacks, though subject to them up to the time of going there, and they returned immediately she came home.

During her last pregnancy, the sneezing as usual left her till she caught a cold when the irritation was limited to the left nostril, and inner canthus of left eye, and during the attacks of severe sneezing, she had discharge only from the left nostril.

In Mrs. M's case, the irritation of a spot near the right frontal eminence supplied by branches of the fifth, produced a violent attack of sneezing lasting several hours; with pricking pain over the spot itself, also throughout the inside of the nose, and the right side of her throat. Thus the irritation produces an abnormal sensation in a limited number of the supra-orbital branches of the right fifth nerves, and this abnormal sensation involving molecular changes in the nucleus, connected with these nerves, spreads through that part of the nucleus in connection with the nerves supplying the mucous membrane of the nose and throat, gives rise to a sensation of pricking in the nose,—a referred sensation—which physiologically excites violent sneezing with its natural accompaniment—discharge of tears and mucus from the nose; further, this molecular change extends to the pneumogastric nucleus of the right side, and hence excites some difficulty of breathing, and wheezing on the right side of the chest.

Again, in those curious cases where the itching and sneezing are caused or increased by food, we must admit that the affection is central. In such cases we must assume that an impression conveyed from the stomach through the vagus, and reaching its centre will, through diminished resistance in this part of the central nervous system, spread from thence to that part of the fifth nucleus in connection with the nerves proceeding from the mucous membrane of the nose, inducing in this part of the nervous centre these molecular changes which impress on the sensorium the sensation of tingling or pricking, and this condition of the nervous centre of the fifth excites physiologically violent sneezing.

In other cases, as I have said, the fault is probably due to an excitable condition of the centre for sneezing, as when the tingling or itching is limited to a very small spot, and is at first sight far too slight both in extent and intensity to produce that violent sneezing which accompanies this tingling. We must admit too I think, that in those cases of severe morning sneezing, accompanying attacks of bronchial asthma, but without any itching, as exemplified in the following case, the disorder is in part situated in the centre for sneezing. In such a case, one would think the asthma must be central and dependent on an excitable condition of the pneumogastric centre in connection with the lungs, and that through loss of resistance, the nervous discharge in this centre would spread to the centre for sneezing, but this view is I think untenable in those cases where the attack of sneezing does not occur during the paroxysm of asthma, that is, when the nervous discharge is greatest in the pneumogastric centre, but at some other time.

A young woman, asthmatic for eight years, though only in winter on catching a cold when she suffers from a violent attack lasting three or four days, growing less on the occurrence of expectoration. When asthmatic, food of any kind tightens her breathing, so that during those days she takes no food. Whilst under the attacks she has paroxysms of sneezing every morning without nasal itching or tingling, when free from asthma she has no sneezing and can eat anything without affecting her breathing.

This case shows the close relationship between both bronchial and peptic asthma, and these attacks of sneezing.

Again, in some cases, the affection would seem to be seated in that part of the central nervous system which controls the formation of mucus in the nose, as in the instance of the lady already referred to, who every morning so suffered for about half an hour from a profuse watery discharge from the nostrils, without any nasal itching or sneezing.

The case I am about to narrate, shows the connection between intermittent sneezing and asthma. This patient for some years suffered from severe intermittent sneezing, which then became complicated with asthma, the asthma meanwhile increasing, whilst the sneezing grew less and less, till it almost ceased. The asthma was peptic in kind, and unassociated with bronchitis. Bed-dust would always induce severe attacks of sneezing, and subsequently of asthma. Now as bed-dust is quite insoluble, it would appear that the part affected, was either the mucous membrane, or the terminations of the nerves, first of the mucous membrane of the nose, next of the lungs, whilst the change of the disease from intermittent sneezing to well-marked peptic asthma, favours the idea that the affection was situated in the nervous centres; possibly both the nerve terminations, and the nerve centres were affected.

Mr. B., about 35 years old, Chemist, has been ill twelve years.

At first he suffered from attacks of sneezing, with profuse watery discharge from the nose accompanied by very distressing and intense itching over a small spot on the inner surface of each ala of the nose near its orifice. There was no itching of the nose beyond the spots indicated, nor of the eyes, nor fauces, but the soft palate felt "rough." The attacks always occurred in the morning, not on first rising, but about nine, and lasted till eleven. He usually attributed their onset to exposure to cold. He sometimes soaked four, usually three pocket-handkerchiefs, with the watery nasal discharge. His eyes during the attacks were much bloodshot. They occurred at any time of the year, though more frequently during spring and autumn.

Bed-dust always brought on a very severe attack. Dust of shop also excited a paroxysm, but not other kinds of dust, as road dust. Smoke did not affect him, nor hay fields, for he has often passed them while the grass was flowering without incurring an attack, so with other flowers. Neither strong sunlight nor strong heat induced an attack, nor ipecacuanha, nor animal emanations, nor linseed poultices. The attacks were not excited through the stomach, for he might eat what he liked at any time without bringing on sneezing, though before this illness, he noticed that a few nuts or a glass of sherry would cause a peculiar indescribable sensation of the chest leading him to take deep breaths. The attacks of sneezing were so violent, that he feared he should "burst some internal vessel," and they left him exhausted. During the attacks he had no dyspnœa. August last, whilst mixing chalk, orris root and myrrh, the powder brought on a severe attack.

About five years ago a singular change came over his illness. He became rather asthmatical, and as the asthma became more pronounced, the sneezing attacks grew less till they have all but left him. There was a period when he was troubled both with asthma and sneezing, but they did not occur simultaneously; indeed, without any question, he said the one took the place of the other, for if he had an attack of asthma, he knew he should not have the sneezing, or if he had an attack of sneezing, he felt insured against asthma. The asthmatic attack begins at 4 a.m., and lasts two hours, sometimes ending with a few outbursts of sneezing but never a paroxysm compared to his earlier attacks, or those alternating with asthma. His asthma is mainly of the peptic character, and is inevitably brought on by a late and especially by an indigestible meal.

Bed-dust formerly excited the asthmatic paroxysm immediately. Cold weather does not cause the asthma, nor fog, nor even when he gets a severe catarrh. Only late meals excite the attack. A dose of colchicum always causes an attack but not till the third nightly dose, occurring "on getting into bed, and for hour just before rising," so long as the colchicum is continued. This effect of colchicum he has noticed on three separate occasions, as he never had occasion to take colchicum during the sneezing period, it is impossible to say whether it would have produced a paroxysm. Ipecacuanha brings on a very slight spasmodic sensation in his throat. Spreading a pitch plaster will always bring on an attack, but never induces an attack of sneezing. The asthmatic paroxysm ends in profuse expectoration with a violent cough, and profuse perspiration possibly due to the cough. During an asthmatic attack he experiences no itching under the chin, nor over the chest nor between the shoulders. His grandfather had asthma, but there is no history of hay fever in his family, and his children are free from both complaints. Arsenic does him good. Strong coffee relieves his attacks; so does nitre paper for a time.

Arsenic in many of these cases is most efficacious, quickly affording relief in some, but in others requiring ten days or a fortnight to manifest its remedial effect, while in yet other cases it altogether fails. I find it of little or no value in true hay fever, that is, where the paroxysmal sneezing is excited by pollen. Where there is fever, aconite, (see Aconite) if given early, curtails the course of the attack considerably. Cases unyielding to arsenic are sometimes benefited by iodine inhalation, by the administration of iodide of potassium, or by veratrum viride. The case of a young woman, 22 years of age, who for several years had suffered with attacks of sneezing like those described, well illustrates the value of local applications. The fits occurred in the morning, lasted several hours, were accompanied by considerable pain over the forehead, and the sneezing was so violent that she became quite exhausted, and so remained the greater part of the day. She complained also of great itching over the whole of the inside and outside of the nose and part of the face, which continued as long as the sneezing. Her health was failing her, and her hair was growing very thin. Arsenic benefited her very slightly, while iodine inhalations, the internal administration of veratrum viride, pulsatilla, iodide of potassium, bromide of potassium, and cod-liver oil were found useless. Then aconite liniment to the outside of the nose and itching part of her face, immediately subdued the attack, removing both the itching and the sneezing. The attacks of sneezing recurred very slightly, and a fortnight's persistence with the treatment cured them.

The changes which arsenical compounds undergo in the stomach are at present unknown. There is no proof that like most other metals it combines with albumen to form an albuminate. The uniformity of action of all soluble arsenical compounds renders it probable that either in the stomach or the blood they ultimately become identical in composition.

Metallic arsenic, like the oxide, is poisonous; it is probably first oxidised before it becomes active. Pure sulphide of the metal is inert, but as it generally contains a not inconsiderable quantity of the oxide, this admixture renders it poisonous.

The condition of the stomach is said to control the action of arsenic; for example, when food is present, the medicine becomes absorbed by the lacteals, and through them mixed with the blood, while if the stomach is empty, the arsenic is absorbed by the veins, and, passing into the liver, is separated with the bile.

In small medicinal doses arsenic excites a sensation of warmth at the epigastrium, and gives rise to a sensation of hunger; indeed, many maintain that arsenic, while increasing appetite, promotes digestion, which others as strenuously deny. Arsenic, as we shall see hereafter, by removing or lessening a morbid condition of the stomach, promotes digestion and appetite.

In certain diseases of the stomach few remedies are more useful than arsenic. In the so-called irritative dyspepsia, where the tongue is furred, and its papillæ red and prominent, a drop of the solution of arsenic, taken shortly before food, will be found of great benefit. Administered in the same manner, it will arrest the distressing vomiting of drunkards with almost unfailing certainty, and simultaneously improve the state of the stomach and restore both appetite and digestion. This vomiting accompanied by great straining and distress usually occurs in the morning before breakfast, and mostly very little, and sometimes nothing, is ejected, and then it is called dry vomiting. The vomit is generally intensely bitter, sour, and of a green colour.

Arsenic is valuable in chronic ulcer and cancer of the stomach, allaying the pain and checking the vomiting; and I have seen this metal give relief in chronic ulcer after failure of the commonly used remedies.

Arsenic sometimes removes heartburn and other distressing sensations of the stomach, and is very useful in gastralgia.

Small doses of arsenic are serviceable in that form of chronic vomiting, when after eating, the patient mostly rejects his meal without pain and with scarcely any nausea, the food simply regurgitating into the mouth.

It has been recommended in the vomiting of cholera.

The solution of arsenic is always of service in that form of chronic dyspepsia and diarrhœa characterized by the following symptoms:—A sinking at the pit of the stomach, which is relieved by food; but immediately on taking it, nay, even during mastication, an urgent desire seizes the patient to relieve the bowels, which may constrain him to quit the table. The motions are solid, or semi-solid, usually containing lumps of half-digested food. The disease appears to depend on excessive peristaltic action of the stomach and intestines, whereby the food, before it is digested, is driven from the stomach to the intestines, and thence expelled. This form of diarrhœa is common with children eight to twelve years of age and may last many months. Arsenic in a few days will prolong the interval between the meal and the evacuation, and in a week or ten days the disease will give way. I always give one or two drops, shortly before each meal. (See Opium). Arsenic often proves useful in other chronic forms of diarrhœa, even when due to serious organic disease, as the bowel ulceration of phthisis, &c.

Arsenic has been strongly recommended in cholera; especially in the later stages, when there is much collapse.

Arsenic enters the blood freely, but the effects of this metal on it are unknown. It has been detected not only in this fluid but in most of the organs of the body.

The statements as to the effects of arsenic when taken for a prolonged period are strangely conflicting; yet probably all are true, though at present it is impossible to reconcile the opposing statements.

Some animals, as the horse and sheep, can take considerable quantities of arsenic, not only without harm but with apparent benefit.

It is now established beyond reasonable doubt that in some parts of lower Austria, as Styria, many of the inhabitants are accustomed to take considerable quantities of arsenic, sometimes as a condiment with food. It is said they often eat it with cheese. They usually begin with a small dose, once or twice a week, the quantity being gradually increased, until half a grain, or a grain, or even more, is taken at one time. This habit seems to induce no untoward symptoms. Arsenic is eaten for a twofold purpose. The women, and even the men, take it to clear the complexion, and to improve the personal appearance; and it is said to effect these objects. The men more frequently use it to enable them to undergo great exertion without fatigue, and they maintain that it enables them to climb mountains and accomplish fatiguing tasks impossible to compass without it. The experience of most countries is opposed to the Styrian practice; for it is generally found that the long sustained administration of arsenic fails to induce tolerance of the drug, but, on the contrary, entails serious consequences. Even in the arsenic-eating countries the habit is not without risk; for there it is a general opinion that many fall victims to the drug. It has been supposed that taken in an insoluble form, the arsenic is not absorbed at all, but passes out with the motions, leaving the system unaffected by it; but Dr. Maclagan's investigations effectually dispose of this supposition, for after witnessing a well-known arsenic eater eat arsenic and afterwards collecting his urine a considerable quantity of the poison was obtained from it.

Ordinary experience, however, shows that the long-continued use of arsenic produces serious symptoms, evidenced first in the eyes and stomach. The eye-lids become slightly œdematous, the lower before the upper; while usually at the same time, or soon after, slight conjunctivitis occurs with suffusion and smarting of the eyes, and sometimes dimness of sight. The mucous membrane of the nose, mouth, and throat may be reddened and inflamed, giving rise to thirst and dryness of the mouth and throat. In some, the digestion becomes deranged much sooner than in others. The appetite fails, and at the pit of the stomach a sensation of weight or soreness is felt, aggravated each time on taking food or the arsenic. Sometimes the stomach is affected before the eyes. On the appearance of any of these symptoms the drug must be given in smaller quantities, or be discontinued. The skin becomes dry and dirty-looking, and a slight "branniness" may be noticed, most marked where the skin is covered with clothes. Eczema or urticaria may arise, or perhaps vesication or mere desquamation with tenderness of the palms of the hands or the soles of the feet, arsenic is said to have produced pityriasis and lichen and aching pains in the head, and swelling and inflammation of the joints. Sleep may be much broken, or disturbed by dreams. Still more serious symptoms set in. The voice becomes rough, and in some cases salivation takes place. Ulcers may form in the mouth. Nausea, vomiting, and diarrhœa, set in, with slimy and bloody motions, voided with much straining and pain. The hair, and even the nails, sometimes fall off. Cough, with bloody expectoration may occur. With these serious symptoms the patient wastes away, the skin becomes dry and hot, the pulse frequent, especially at night. Pains in the limbs, neuralgic pains, anæsthesia, tremblings, and even paralysis, come on; till at last the memory fails, sensation is lost, and death soon follows. The susceptibility to arsenic varies; some being speedily affected by two-drop doses of the arsenical solution, while others can take ten to twenty drops without injury for a considerable time. Dr. McCall Anderson states that patients while taking arsenic are liable to bronchitis, and should therefore be cautioned against exposure to cold.

A large dose induces the symptoms of acute poisoning. The arsenic acts as an irritant to the whole digestive canal, exciting very active inflammation in its delicate mucous membrane; accordingly the symptoms to be expected from severe inflammation of this tract set in. But, strange to say, the symptoms following a large poisonous dose are not invariable; the symptoms arising from acute inflammation of the digestive canal are most common, and prove fatal in four or five days; but sometimes these symptoms are almost or entirely absent, and instead of the patient running the usual course of arsenical poisoning, profound coma sets in, from which he never wakes, but dies in a few hours, the mucous membrane of the stomach and intestines being free from all inflammation. Sometimes the symptoms are very like those of English cholera. (Virchow).

Dr. Blachez describes another form of arsenical poisoning characterized by choleraic symptoms of the intestinal canal, with suppression of urine, cramps, and progressive coldness of the body, convulsions, and localized paralysis especially attacking the extensors. If the patient survives long enough a petechial papular vesicular and wheal-like rash often appears from the second to the fifth day.

Even when injected into the blood, or applied to a wound, arsenic produces its local effects on the digestive canal, being found in the intestines, showing that this is one outlet by which the poison is eliminated. When the metal is injected into the blood or absorbed by a wound, the effects on the stomach and intestines are said to be as severe as when it is swallowed. This is perhaps hardly true. It is evident from the foregoing facts that arsenic manifests an especial affinity for the mucous membrane of the intestinal canal.

The *post-mortem* examination in acute arsenical poisoning shows much inflammation of the stomach, often in patches, in which arsenic powder is visible, imbedded in the the thick viscid mucus, and, according to Harley, the arsenical mischief is most marked at the cardiac end. Spots of ecchymosis are sometimes seen, and less commonly ulcerations. Perforation is rare. The œsophagus and intestines may undergo inflammation, often most severe in the rectum. Occasionally the mouth, throat, and even windpipe and bladder, become inflamed. The curious fact has been pointed out, that notwithstanding the existence of symptoms of inflammation, yet sometimes no traces of it are apparent after death. This absence of inflammation cannot be explained by want of time for the arsenic to act; for in cases ending in death yet more rapidly, severe structural changes are to be found. Death may occur in two hours. Ecchymosis is commonly met with under the lining of the cavities of the heart. Like phosphorus it is said to produce extreme fatty degeneration of the liver, heart, kidneys, and other structures. Ether, and even chloroform are said to produce similar effects. Both in arsenical and antimonial poisoning the glycogenic function of the liver is said to be destroyed.

Frogs become apparently paralysed after poisonous doses. For instance, they remain motionless, but when placed on their backs they struggle violently to regain their habitual position, showing that there is no paralysis of the voluntary muscles or motor nerves. At the same time they lose all sensation, for they may be pinched, cut, or burned, without exhibiting signs of pain. This loss of sensation is proved to be due to the action of the drug on the spinal cord, and not on the sensory nerves. The apparent paralysis is supposed to be due to this loss of sensation.

Arsenic, in moderate doses, it is said, gives fulness and increased strength to the pulse. Sklarek finds that arsenic given to frogs and cats slows and weakens and at last arrests the heart, and that then galvanic stimulation excites it only to imperfect contraction. This result is probably due to the direct action of the arsenic on the heart, for both Sklarek and Harley find that it produces the same effect on the extirpated organ. From Harley's observations, it appears, that after death, the heart of an animal poisoned with arsenic ceases to beat sooner than that of one destroyed by mechanical means.

Some give arsenic in prostrating acute febrile diseases, with the effect, so they aver, of strengthening the pulse, moistening the skin, and invigorating the patient.

Dr. Bayes recommends arsenic for the swelled feet of old or weakly persons; or for old people with a weakly acting heart and feeble circulation, who often suffer from breathlessness on exertion.

Arsenic has long been recommended as an excellent remedy, in spasmodic diseases of the lungs; it is often useful in asthma, whether dependent on emphysema or not.

Arsenic often gives great relief to a class of emphysematous persons who, on catching cold, are troubled with slight wheezing at the chest, difficulty of breathing, especially on exertion, or at night time, and are obliged to be partially propped up in bed; it appears, however, to be of little service when there is very much bronchitis, or when the paroxysms of dyspnœa are very urgent. In this contingency lobelia or belladonna answer better. Arsenic is especially useful in the foregoing cases, where the difficulty of breathing can be connected with the retrocession of a rash, as eczema. Arsenic generally relieves the wheezing with oppressed breathing, which affects some children for months, and even years.

Arsenic lessens the carbonic acid of respiration.

The beneficial influence of arsenic in certain skin diseases, particularly in the scaly eruptions and in chronic eczema, is universally recognized. Lepra almost always yields to it, and its efficacy over other forms of psoriasis is hardly less marked. Many cases it cures, others it improves, but a few it leaves unbenefited.

Hunt, who has had more experience of this remedy than perhaps any other person, laid down excellent rules for guidance. He recommends small doses as capable of effecting all that is possible by arsenic, and discountenances the practice of gradually increasing the dose. If toxical effects arise, he advises, not the discontinuance but the diminution of the dose.

Arsenic is hurtful during the inflammatory stages of eruptions.

Children above five years will bear a dose nearly as large as adults; and it is curious that girls often require a larger dose than boys.

The largest dose ever required is five minims, repeated three times a day;

but some practitioners give double or even treble this quantity. As a rule it should never be given on an empty stomach.

Arsenic, if mixed with food, does not usually irritate the bowels. In the course of a few days or weeks it will produce an itching or smarting in the conjunctiva, and this membrane will appear slightly inflamed, the lower eyelid becoming a little puffed or swollen at this point. The cutaneous disease will now begin to decline, and the dose must be reduced one-fifth.

Should the conjunctiva continue much inflamed, the dose must be still further reduced, but the conjunctiva should be kept affected throughout the whole course.

If the skin become more inflamed, the course must not be interrupted, but an occasional aperient must be taken.

The arsenical treatment must be continued for as many months after the final disappearance of the eruption as it has existed years before.

These rules closely correspond to the advice given by Dr. Graves in his clinical lectures. With two statements made in this "code of regulations" my experience does not quite correspond, for I have not found that smarting of the eyes and swelling of the lower lid occur so often as Mr. Hunt implies; nor do I find it necessary to induce these toxic symptoms to insure the beneficial influence of the remedy.

The first influence of arsenic on psoriasis is to make it redder more inflamed, and to look worse than before treatment, a fact, which if not known would lead to the suspension of the drug just when it commenced to do good; but the exaggerated redness soon declines, the eruption heals in the centre, leaving in a short time only a slight redness.

Chronic eczema, although perhaps not so amenable to arsenic as psoriasis, is generally benefited by it, especially the obstinate chronic forms. It sometimes removes the rebellious eczema which infests the vulva, the verge of the anus, and the scrotum.

Arsenic will generally cure that troublesome disease pemphigus, as Mr. Hutchinson has shown; and although after a variable interval the eruption is liable to recur, it will again yield to a renewed course of the drug.

Arsenic sometimes relieves lichen and other obstinate skin affections.

Few, if any, remedies are so successful in chorea as arsenic. If there is much anæmia, iron is required; if fever or rheumatism, these must be subdued by appropriate treatment. But, in simple uncomplicated cases of chorea, arsenic is far the best remedy. Its occasional non-success is sometimes owing to the undue smallness of the dose, and decided improvement often begins simultaneously with a freer administration of the medicine. When chorea has resisted smaller quantities, children may take four, five, or more minims of the solution.

Chorea may probably depend on various kinds of lesions of different parts of the nervous system, which suggestion may perhaps afford an explanation of the not unfrequent failure of arsenic.

Dr. Hughes and Dr. Cooper highly commend small doses of arsenic in neuralgia. Dr. Anstie also speaks highly of it in various neuralgias; and in angina pectoris, a disease he regarded as a neuralgia, he states that it will lessen the severity of the attacks, reducing them in time to mere "tightness of the chest."

Arsenic has been found serviceable in epilepsy. It not unfrequently cures dull throbbing pain affecting one brow.

With the exception of quinia, no drug subdues intermittent fever like arsenic. Some indeed with large experiences count arsenic equal, if not superior, to bark in ague. The greater number of observers, however, do not credit arsenic with such pre-eminent virtues, maintaining that cinchona cures the disease more quickly and more certainly, and that it is especially to be preferred in those malignant forms which, unless at once arrested, speedily destroy life. A concurrence of testimony tends to show that arsenic is most useful in long-standing agues, especially of the quartan type.

Arsenic has lately been extolled in phthisis and tuberculosis. It is said to improve the appetite, increase assimilation, lessen expectoration and cough, and to promote the cicatrization of cavities. It is stated that it will reduce the temperature in tuberculosis, and after carefully investigating this subject, I am inclined to believe so; at least I have frequently observed a steady and sustained fall of the thermometer follow the use of arsenic in cases where the undue temperature had continued unchanged for a considerable time, and this I have known happen twice or three times in the same case on reverting to arsenic after it had been discontinued. The decline generally takes place gradually and may begin soon after taking the arsenic, or the fall may be postponed for ten or twelve days. Moreover, I have seen children in a hopeless state, with severe tuberculosis involving lungs, intestines and peritoneum, steadily and slowly improve and ultimately recover under arsenic treatment, and I have observed a like result in adults with phthisis, especially in the subacute and chronic forms. It must, however, be admitted that this is a very intricate subject, seeing how irregular a course the fever of tuberculosis runs, and how sometimes cases the most desperate recover by means of other treatment or indeed through little or no treatment. Still, I am sure that the action of arsenic in phthisis and tuberculosis is well worthy investigation. I have generally given from two to four minims every two to four hours. In a few cases it is ill borne, producing sickness and pain in the stomach and bowels.

Arsenic is often serviceable in rheumatoid arthritis and nodosity of the joints, but the indications for its employment are unknown. The pains of this troublesome affection are sometimes increased, sometimes benefited, by heat, some cases being worse in summer, others in winter; some are worse during the day, others at night. All these forms arsenic will sometimes cure, yet its action is capricious, for in cases apparently identical it sometimes fails and sometimes cures. Its effects are sometimes astonishing, for stiffened joints, for a long time considerably enlarged, become reduced to their natural size, and regain their suppleness. Large doses are necessary, given for a considerable time, and it must be borne in mind that if improvement does not speedily ensue it must not be concluded that the medicine will fail. Some consider it necessary to produce the toxic effect of arsenic; but in many cases improvement certainly results without pushing the remedy to this extent.

Dr. Simpson employed arsenic in that peculiar affection of the bowels prevalent among women, characterized by the copious discharge of membranous shreds, accompanied by much emaciation, and a long train of neuralgic and other nervous symptoms —an affection occasionally co-existing with dysmenorrhœa, the membranous shreds being discharged both from the bowels and uterus.

Like other metals, arsenic, though more quickly eliminated than some metals, as lead, is retained a long time in the body. Some maintain that arsenic is to be found in the bones as arseniate of lime, a statement denied by others. It may be detected in the milk.

It is found in the blood chiefly with the red corpuscles. It is separated from the body by the urine, the stomach, and intestines, and perhaps by the liver. After arsenical poisoning, the metal is found in the liver in quantities larger than elsewhere. · It may be that, like many other metals, it is separated from the body with the bile.

We know nothing of its influence on the composition of the urine. Some experimenters assert that the urea is lessened, and as the carbonic acid separated by the lungs is diminished, they conclude that arsenic diminishes tissue metamorphosis to a considerable extent. Vogel observed hæmato-globulin in the urine of an individual poisoned with arseniuretted hydrogen.

Dr. Garrod states that arsenic acid is less irritating to the stomach than arsenious acid.

PHOSPHORUS.

This substance for many years had fallen into disuse, but owing to its signal success in neuralgia in the hands of homœopaths, it has again recently risen to favour.

In doses sufficient to produce acute poisoning, its effects are very singular.

It is an irritant poison, but the symptoms are sometimes delayed for hours or even days. The patient complains of burning in the throat with intense thirst and severe burning pain in the stomach, followed by distention of the abdomen and vomiting a dark green or black substance with the odour of garlic, and sometimes phosphorescent. There are the usual symptoms of collapse. In less severe cases, vomiting ceases on the second or third day, but on the occurrence of jaundice which often happens, the sickness returns, and the rejected matter contains dark coloured blood. There is now pain and tenderness over the liver, generally diarrhœa, and later the stools become clay coloured. At first, it is said, there may be fever, the temperature rising even to 102°, but subsequently the temperature sinks below the standard, and in one case it fell to 89° Fah. in the rectum. Jaundice sets in from the second to the fifth day, and at first the liver is apparently enlarged, but afterwards it becomes considerably lessened. The urine is generally scanty, albuminous, and sometimes bloody. It deposits epithelium cells, and when there is jaundice it contains biliary acid and colouring matter with leucine and tyrosine. Hæmorrhage and purpura often occur. Later, either delirium sets in or coma, which may terminate in convulsions. The *post-mortem* reveals most of the tissues in a state of advanced fatty degeneration. In the stomach and intestines, there is general inflammation of the glandular structures; hence the mucous membrane is thickened and whitish. The epithelium is granular or fatty and much degenerated or even broken up. The liver is either enlarged, with its cells in a state of advanced fatty degeneration or is contracted from destruction of its cells. The kidneys are similarly affected, the epithelium being swollen, granular, fatty or broken up. The heart, the voluntary muscles and other structures are also implicated. The fatty degeneration affects likewise the whole of the arterial system, down to the microscopic arterioles, (Wegner) and the number of the blood discs are said to be lessened.

The effects of chronic phosphorus poisoning have lately been elaborately worked out on animals by Dr. George Wegner, with most singular results. It has long been known that workmen exposed to the fumes of phosphorus are liable to necrosis of the jaw, and Dr. Wegner believes that this results from the direct action of the phosphorus on denuded bone, and that necrosis will not set in unless through wounds or carious teeth there is some destruction of the soft tissues, thus enabling the phosphorus to reach the exposed bone; in support of this view he adduces the following reasons:—1. If the periosteum of an animal is severely wounded, and phosphorus is given in the form of a pill, even for months, the periosteal changes do not take place; 2, when the tibia of a rabbit is partially bared, a healthy granulating wound is soon established, but under exposure to a phosphorus atmosphere, periostitis is set up similar to that in the jaw; 3, many workers in phosphorus escape, whilst those who do suffer have carious teeth.

Dr. Wegner found that gradually increasing doses of phosphorus or phosphorus fumes administered to rabbits produced congestion of the mucous membrane of the stomach, this membrane becoming of a brown colour and three times its natural thickness. The liver is chronically inflamed, with great increase of the interstitial tissue, affecting earliest that portion surrounding the acini. This new tissue contracts, producing atrophy of the liver cells, and obstruction of the vessels and ducts. The organ, at first enlarged and livid in colour, sometimes gradually changes into the hob-nailed liver or into a shrunken irregular mass, deformed by contracting bands.

Given in doses too small to affect the stomach and liver, phosphorus modifies the bones, especially in growing animals. Thus, where spongy tissue should be formed in the growing bone, dense solid tissue takes its place, which examined by the naked eye and microscope is found to consist of well-formed bone, and if the administration of the phosphorus is continued, the proportion of dense bone increases, and the cancellous structure, in accordance with a natural process, becomes absorbed to make room for marrow tissue, till at last no cancellous structure is left, and afterwards the solid newly-formed tissue itself also undergoes absorption. Changes occur likewise in the bony substance formed by the periosteum. The new bone looks natural, but the microscope reveals that it is dense, and compact masses of it encroach on the Haversian canals, producing in them at last a general narrowing which affects even bone formed previous to the administration of phosphorus. If phosphorus is given for a long time to adult animals, the spongy tissue thickens, and the compact tissue becomes still more dense, and after a time new bony tissue is deposited on the inside of the shaft, increasing till the bone actually becomes solid. The chemical composition of the bone is natural.

Dr. Wegner found also that under the influence of phosphorus, callus after fractures or resection becomes more dense, and the formation of new osseous tissue is favoured.

The changes above described are produced by phosphorous as such, and not after its conversion into phosphoric acid. For phosphoric acid does not produce the peculiar changes in the stomach and liver. It does, however, affect the bones similarly, in very large quantities, larger than could be produced by the phosphoric acid generated from phosphorus introduced into the system. Wegner considers that it acts as a food, promoting natural growth.

In acute poisoning, phosphorus itself is absorbed unchanged, for in some cases, the breath, the urine, and after death the tissues themselves are luminous ; moreover, it has been chemically detected in most of the tissues.

The jaundice occurring in acute phosphorus poisoning has been variously explained. Dr. Ebstein holds that it is not due to destruction of the liver cells, but to catarrh of the small biliary ducts, causing obstruction and leading to absorption of bile. The ductus communis choledicus has sometimes been found occluded by a tenacious plug of mucus, thus greatly assisting the obstruction of the smaller ducts in the production of jaundice. The presence of biliary acids in the urine when jaundice occurs, certainly supports the view that the jaundice depends on absorption from obstruction of the ducts, rather than from suppressed secretion owing to the destruction of the liver cells. Sometimes the contents of the intestines are found destitute of bile.

According to Mr. Ashburton Thompson, the effects of repeated medicinal doses are improved appetite, increased rate of circulation, a heightened temperature, perspiration, irritation of the skin, abundant urine sometimes loaded with deposit, a sharpening of the mental faculties, increase of muscular power, a sensation of well being, sometimes nervous excitement shown by hesitation and trembling (effects more readily induced in some persons than in others), even slight clonic convulsions, occasionally some venereal ardour, and less frequently, a more acute tactile sensibility.

Sometimes, even after doses now considered medicinal, as for instance $\frac{1}{30}$ gr., we get sickness and jaundice which may last weeks or months. The drug appears to affect some persons much more easily than others, and this uncertain action long known used to be ascribed to "idiosyncrasy;" but Mr. Thompson believes it is rather due to the preparation, and states that when medicinal doses prove poisonous, it is owing to the conversion of the phosphorus into hypophosphorus acid, pointing out that formerly when this variable action was more often noticed, the phosphorus was generally administered dissolved in vegetable oil, which containing a large quantity of dissolved air, oxidizes the phosphorus. The air may be driven off by super-heating the oil, but even then Mr. Thompson disadvises its use, prefering an animal oil, or an alcoholic or ethereal solution, but these preparations are simply unendurably nauseous, yet he says he gives in this way, doses which could not be tolerated in other forms. I am indeed told by experienced pharmaceutists that in the solutions Mr. Thompson recommends, it is impossible to dissolve the quantities of phosphorus he directs, either in absolute alcohol or ether, so that I am constrained to think that the record of his experience of the comparative harmlessness of alcoholic, or ethereal solutions, is destitute of scientific accuracy. It has been asserted that phosphorus in medicinal doses sometimes causes hæmaturia and albuminous urine, but this must be unusual, for having employed phosphorus in a very large number of cases I have never seen this result.

Phosphorus has been given lately in neuralgia with considerable success. It appears to be efficacious in neuralgia of any part of the body. Some regard phosphorus as well nigh a specific. As might be expected chronic cases take longest to cure, but in all the instances susceptible of benefit, relief follows the few first doses. Mr. Thompson employs large doses, giving never less than one-twentieth, and generally one-twelfth of a grain every three hours. Some writers think one-hundredth of a grain a sufficient dose.

The most intractable and severe cases generally occur, as Dr. Anstie points out, in the degeneration period of life; but even in these instances phosphorus may prove useful. My own experience hardly warrants me in speaking so enthusiastically of this drug as does Mr. Thompson. Yet though it not uncommonly fails in the severe forms of neuralgia of middle and advanced life, still it must be considered one of the most valuable, perhaps the most valuable remedy. In my hands it has yielded less satisfactory results in sciatica than in many other forms of neuralgia. Phosphorus is probably most efficacious in typical neuralgia, and much less useful, according to my experience in those imperfectly-developed cases, where the neuralgia appears to be allied to, or passes into sick headache or pleurodynia, and in those instances of nerve pain which lack many of the more distinctive characters of neuralgia. Phosphorus is often serviceable in angina pectoris, a disease which is closely allied to, if it be not a true, neuralgia.

Dr. Richard Hughes recommends phosphorus in chronic inflammation of the rectum, and Dr. Fleischmann of Vienna, approves its use in pneumonia, especially if accompanied by typhoid symptoms.

Phosphorus has been tried in a variety of diseases. General nervous prostration, many affections of the nervous system, as mercurial tremors, paralysis agitans, and locomotor ataxy, in impotence, &c., but at present the evidence of its influence over these diseases is very unsatisfactory.

Mr. Thompson says phosphorus, unless given in large and unsafe doses, is not an aphrodisiac nor useful in spermatorrhœa, but that in small tonic doses $\frac{1}{30}$ to $\frac{1}{50}$ gr. it will remove the physical and mental debility induced by spermatorrhœa. A large dose, Thompson says, acts as a stimulant to the brain, and fits it for unusual exertion and so obviates physical and mental exhaustion or depression from over work.

Hammond praises phosphorus in cerebral softening and in hysterical paralysis, and Anstie in chronic alcoholism, and Thompson recommends it strongly in migraine.

It has been asserted that phosphorus largely increases the quantity of urea of the urine, splitting up it is said the nitrogenous tissues and converting them into fat and a compound which ultimately forms urea; others hold that the fatty degeneration is due to deficient oxidation (see Turpentine).

Phosphide of zinc, $\frac{1}{6}$ gr. to $\frac{1}{2}$ gr. doses has been strongly recommended in place of phosphorus. In compounding phosphorus it must not be mixed with turpentine, since with this and probably with other essential oils, it combines and forms an inert compound; indeed turpentine itself is used as an antidote in phosphorus poisoning. Eulenberg and Guttmann point out that with a solution of copper, phosphorus immediately forms a phosphide of copper, and Bamberger's experiments lead him to conclude that copper salts are far more efficient antidotes than turpentine (see Turpentine).

Red allotropic phosphorus is inert.

COLLODION.

Collodion is useful in many ways. It is used to adjust accurately and bind together the edges of cuts and wounds, and to exclude air. It is sometimes applied to chapped hands and chapped nipples; but for these affections there are better applications as glycerine of starch, arnica cerate, or two parts of eau de Cologne to one of glycerine. For chapped nipples, often so difficult to heal, equal parts of sulphurous acid and glycerine is a useful combination.

Collodion, painted over superficial erysipelas, slight burns, or patches of herpes before vesicles are developed, subdues inflammation, eases pain, and checks vesication. Unfortunately the collodion coating often cracks, admits air, and ceases to be efficacious; hence collodion is inferior to a solution of nitrate of silver in water or nitrous ether. (*Vide* Nitrate of Silver).

Dr. Hare, we believe, first employed collodion for boils. There are many kinds of boils. The common form begins as a pimple or pustule, whence the inflammation spreads, producing a hard painful swelling, the centre of which dying forms a core. Now if collodion is applied at the papular or pustular stage, the swelling around the pustule subsides, and the further development of the boil is arrested in the pustular stage,collodion appearing to be useless if the pustule has burst. The matter must not be let out after the collodion application, or inflammation recommences, and the boil follows the usual course. It is desirable to apply fresh coatings of collodion over the old ones, allowing them to remain till the pustule has dried up, and the sore has healed. If much pus accumulate beneath this covering, causing considerable pain, the collodion should be incised under carbolic acid, and the pus allowed to escape, the subsequent treatment being conducted on Lister's carbolic acid plan. This treatment allays the great irritation often accompanying the early stages of boils. Dr. Hare prefers the contractile collodion, attributing its success mainly to the pressure it exerts. I have succeeded with flexible collodion, but perhaps the contractile would have answered still better.*

Collodion, solutions of gutta-percha, or india-rubber in chloroform, prevent the pitting of small-pox. The flexible variety of collodion is better for this purpose.

A mixture of collodion and carbolic acid is useful in toothache due to an exposed and inflamed pulp. A jelly is made by melting in a test-tube some crystallized carbolic acid, then adding an equal quantity of collodion. A portion of this preparation on a small piece of cotton-wool is inserted into the hollow painful tooth, with sometimes aggravation of the pain, but in a few seconds it begins to diminish and soon ceases.

Contractile collodion, with which some mix iodine, painted over the inflamed part in acute gout, will speedily relieve the pain, although for a brief space the application increases it. Too many coats must not be applied, or the contraction is too great and dragging on the skin, exciting a good deal of pain, or even producing vesication.

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* The extension of a carbuncle may sometimes be limited by tightly strapping with strips of adhesive plaster applied concentrically from the border inwards, around and over the swelling.

Sir D. Corrigan treats the incontinence of children with collodion. The prepuce is drawn forward by the left hand, and the little cap thus formed at its extremity is smeared over with collodion, which contracting, draws closely together the edges of the prepuce, and effectually prevents the exit of urine. A fortnight of this plan, which gives no pain and does not prevent sleep, sometimes suffices for the cure. When it is needful to pass water, the little cap of collodion can be easily chipped off with the nail. The prepuce in the morning is found distended with urine. Sir D. Corrigan thinks that it would answer as well to paint the collodion over the orifice of the urethra. This plan I find unsuitable for girls as it excites smarting, and induces them to pick off the collodion.

Two parts of glycerine to a hundred parts of collodion sets without contracting or dragging the skin.

COD-LIVER OIL.
ALMOND OIL.
POPPY OIL.
HEMP-SEED OIL.
LINSEED OIL.
COCOA-NUT OIL
DUGONG OIL.
PALM OIL.
LARD.
SUET.
WAX.
&c.

FATS, in one form or other, are found abundantly in both the animal and vegetable kingdoms, showing their great importance in organic life.

Fats are necessary foods to the animal body, being heat-giving, force-supplying, and plastic. Their combustion contributes mainly to the generation of the heat of the body. They are essential to tissue-formation, for without them nutrition and growth would be very imperfect, if not impossible.

Their combustion, moreover, supplies most of the force appropriated by the nitrogenous structures, and through them to be converted into muscular force, secretive force, nerve force, &c.

For the most part, all fats, so far as we know, have the same physical properties, differing only in the melting point. In their chemical nature, however, they differ much, but after entering the blood they are probably converted into a fat of uniform composition.

Oils and fats are used to lubricate and to supple the skin when it has lost its elasticity and become dry, hard, and liable to crack; for instance in many scaly diseases, as psoriasis and xeroderma. They should be employed in conjunction with warm baths.

Fats, moreover, are applied to the surface of the body to prevent irritation from such excreta as urine or fæces, or by acrid discharges, as in eczema, and when used for this protective purpose, some stimulating substance as oxide of zinc is generally incorporated with them.

Simple oils are used to soften and facilitate the removal of scabs, as of impetigo, eczema, and favus. Poultices are likewise useful in favus preparatory to epilation.

Oils are sometimes, with occasional success, rubbed into the skin of the whole surface, to prevent the debilitating sweating accompanying exhausting diseases, as phthisis; but this process is inferior to that of sponging the skin with a weak acid wash, and to other means. With the ancient Romans, during the decline, when warm baths were so much indulged in, it was the custom to anoint the body with fats to check the profuse sweating caused by this enervating habit.

Fats are sometimes rubbed into the skin with a view to their absorption, so as to minister to the nutrition of the body.

Fats and oils are in general use as excipients for the application of various agents to the skin.

It has been asserted that, the inunction of the body with fatty substances will induce a considerable fall in its temperature; but in a solitary testing instance I found this statement to be incorrect.

Rubbing the hands and feet with some firm fat will remove the irksome sensation of heat and tightness produced by the rashes of scarlet fever or measles.

Some practitioners treat scarlatina solely by inunctions, anointing thoroughly the skin of the whole body twice or three times a day with a bland fat or oil which is not to be wiped off during convalescence from scarlatina. Dr. Budd, of Bristol, recommends the inunction of oil; the patient takes a bath at night, and after being wiped quite dry, a bland oil, like almond oil, is rubbed over the whole body. This treatment is said to assist desquamation, and to prevent sequelæ: moreover it probably lessens the risk of contagion by preventing the diffusion of the branny particles of the skin by currents of air.

In cases of ringworm it is a useful practice to prevent the extension of the disease by greasing the head very freely to hinder the sporules reaching the unaffected hair. The uncontaminated members of the family should also use grease to the hair freely for the same purpose, and probably it would be more preventive to use a mild mercurial pomade, or quinine dissolved in glycerine, so that the sporules may alight on some substance destructive to them.

Oils and fats are not used topically in diseases of the mouth, nor do fats undergo alteration in this cavity, and they are almost as little affected in the stomach. If enclosed in albuminous walls, as in the form of cell, these being dissolved, the fat is set free. Although themselves not acted upon by the stomach, fats, however, act upon the other forms of food; they certainly promote the fermentation of sugar and starch; and it is generally accepted, that fats, by assisting those chemical changes which constitute digestion, aid the conversion of the nitrogenous food. For example, fats assist the fermentation of milk, and promote the process of artificial digestion; and this action of fats upon food can be demonstrated outside the body. But how fats effect these changes, and whether at the same time they themselves are in any measure modified in constitution, are questions at present quite unsettled. The importance of this property of fats must be sufficiently apparent, and needs no further comment. In large quantities they hinder digestion, possibly by their decomposition and the formation of acids foreign to the stomach.

Fats undergo a variety of changes in the intestines; among others, they are absorbed both by the lacteals and veins, but it is still an undecided question how this process is effected.

The alkaline pancreatic juice emulsionizes fats and in this condition their absorption is supposed to be facilitated; but it is difficult to understand how mere division should assist their passage from the intestines to the blood; further, it is maintained that when the pancreatic duct is tied, animals remain as fat as before.

It has been surmised that fat may become saponified and so pass through the walls of the intestines into the blood, and probably a small part does pass into the circulation in this form; but as much unsaponified fat is visible in the epithelium cells covering the villi, and much can be extracted from the chyle, the chief part must undergo absorption in another manner.

The passage of fats through the moist animal membranes forming the intestinal canal is probably justly ascribed to the action of the bile; and in support of this proposition, apart from other evidence possible to adduce, it may be advanced that:—

I. In capillary tubes moistened with water fats rise scarcely at all; but if the tubes are moistened with bile the fats rise from twelve to fourteen times higher.

II. While fats pass with extreme difficulty through moist animal menbranes, if these are moistened with bile, the fats, as may be shown experimentally, pass readily.

Fats pass, to a small extent, into the blood by the agency of the intestinal juice.

The chief part of the fat passes into the lacteals; a little into the veins, to be conveyed to the liver, there to be converted into cholic acid; or, at least, it is probable that the oleic acid undergoes this change. The cholic acid, uniting with the soda set free when the hydrochloric acid of the gastric juice is poured into the intestines, forms a kind of soap, namely, the taurocholate and glycocholate of soda. These again find their way into the intestines, and after serving their destined purpose there, the base reunites with the acid of the gastric juice from which it has been separated.

The influence of fats on the secretion of bile varies according to circumstances; if taken on an empty stomach, fats lessen the biliary secretion; if taken with or after food, they increase it.

As food greatly augments the flow of bile, we have here an indication, abundantly corroborated by experience, to give fats either with or soon after a meal.

The melting point of a fat must influence its absorption; for if this point is above the temperature of the body, the fat, unless dissolved in the more liquefiable fats, must remain unabsorbed.

The stomach tolerates animal far better than vegetable fats; moreover, animal fats may be given in larger doses, and for a longer time; circumstances, which in some measure, explain the medicinal superiority of animal over vegetable fats.

There is a limit to the quantity of fats absorbable by the body. In regard to cod-liver oil at first only a small quantity is taken up, and often for some weeks some of it appears in the motions; however, more and more of it becomes absorbed, till full doses are borne, and find entrance into the circulation; but in too large a quantity this oil is liable to decompose, and to form hurtful acids, exciting nausea, vomiting, colic, and diarrhœa. This limitation to the quantity absorbed, as well as the irritation caused by any excess remaining in the intestines, are sufficient reasons, to say nothing of economy, to make it undesirable to give more fat than can be appropriated. Too large a dose is both wasteful and harmful. By examining the motions day by day we can at any time ascertain if too much is administered.

Catarrh of the intestines is a condition unfavourable to the absorption of fat. Oils are sometimes given after a poisonous dose of a corrosive substance, with the intention of forming a protective sheathing to the mucous membrane, but it is impossible to give a coating of oil to a membrane moistened with water.

Fat is speedily saponified in the lacteals and bloodvessels, and most of it in the blood vessels appears to collect in the blood corpuscles, and may contribute to their formation, growth, etc.

Fats, as we have said, are heat-giving, force-supplying, and plastic. In common with other combustible substances, they through oxidation, uphold the temperature of the body. This, though an important, is not their only, nor their most valuable, function.

Fats, like phosphate of lime, are necessary both to growth and nutrition; for in the most vitally-endowed organs, fats are found in excess, and abound wherever cell-growth proceeds rapidly; it abounds even in disease, for much fat is found in fast growing cancer; it is found, moreover, associated with the more highly organised constituents. Thus the fat existing in pus is chiefly associated with the corpuscles, comparatively little being found in the serum. More fat is found in plastic, than in non-plastic formations; in fact, observations day by day demonstrate more and more the importance of fats as tissue-forming substances. Facts like these obviously bear on the use of the

members of this group in disease; but to this subject we shal
return shortly.

Recent observations tend to show that fats are force-yieldin
substances, and that the peculiar forces of the body are mainl
derived from the fats we consume. Only a short time ago i
was considered that the forces of the body were derived from th
combustion of the nitrogenous structures, but many circumstances tell conclusively against this hypothesis.

1. After severe and prolonged exercise, the urea of the urine is scarcely increased; and as this substance is a measure of the consumption of nitrogenous materials, it follows that at such times but little of it is consumed.
2. Under exertion, enormous quantities of carbonic acid are exhaled from the lungs, pointing indubitably to the combustion of carbo-hydrates, or of fatty substances, the urea at the same time not being increased.
3. The combustion occurs chiefly, not in the blood, but in the muscles themselves; for when these are separated from the body, and made to contract under a bell-glass, they are found to yield, during the time of their activity, an enormous quantity of carbonic acid.
4. It has been found by experiment that when only starchy and fatty foods are eaten, great exertion and prolonged labour can be endured, while at the same time the urea of the urine is but little increased.

Fats, being necessary to growth, nutrition, and the due performance of the bodily functions, are peculiarly suited to convalescents from acute general diseases. Fats are also useful in many chronic affections. On the subsidence of many acute inflammations, as of the kidneys, heart, or lungs, a chronic, but not less fatal, condition may be left, a condition the danger of which is in proportion to the health of the patient previous to the acute attack. If the patient's health has been impoverished, or if he is the subject of tuberculosis, or of scrofula, many sequelæ are apt to occur. Middle-aged and old people, in whom the nutritive process begins to flag, are more liable to chronic diseases after acute attack. A like danger threatens children whose previous health has been damaged by unhygienic conditions. It benefits the chronic degenerative diseases of old age. These and other maladies depend on deficient nutrition, and as fats are peculiarly promoters of this function, they are especially useful in such chronic maladies.

The dependence of chronic affections on the state of general nutrition may be shown in another way. Persons are found to suffer from some slight local affection, but little troublesome, while the health is unbroken, but as the weakest link of the chain is the first to yield, so if the health gives way, the local mischief becomes immediately developed or aggravated. Thus many individuals are able to measure the state of their general health by the condition of a local disease. Here, again, any treatment restorative of the general health will reduce the local affection to its former unimportant state, and in such a case cod-liver oil is often indicated.

Thus experience confirms the efficacy of cod-liver oil in many chronic inflammations, as of the heart, lungs, and kidneys, and in the sequelæ of the acute specific diseases, as the chronic discharge from the ears or nose so often left by scarlet fever or measles.

Cod-liver oil is of special service in scrofula, tending to remove the various manifestations of this disease, as chronic discharge from the ears and nose, strumous ophthalmia, strumous disease of the bones, strumous abscesses, etc.

In the treatment of phthisis cod-liver oil stands pre-eminent. The term phthisis, however, includes several distinct diseases. For our purpose it is sufficient here to divide them into the febrile and non-febrile varieties :—those forms manifesting preternatural heat of the body, and those in which the temperature is natural, or rises only occasionally, and for a short time. The existence of fever in the febrile forms of phthisis is by no means an indication of the uselessness or harmfulness of cod-liver oil, for in this condition many patients derive considerable benefit from it. In this form of phthisis, as, indeed, in all cases, we must be guided, in the employment of this remedy, not only by the nature of the disease, but also by the state of the patient in other respects. If the digestion is good, cod-liver oil may generally be given with advantage; but, if the stomach is irritable, then cod-liver oil does harm by still further disordering it.

In the chronic or non-febrile forms of phthisis, cod-liver oil is generally well borne and does great good; but, as with the more acute varieties, it sometimes upsets the stomach. It is generally held that diarrhœa in phthisis is a decisive indication against the employment of the oil; but this is only partly true. Cod-liver oil, no doubt, sometimes increases diarrhœa, but this chiefly arises when the dose is unduly large, or too frequently administered; if only a teaspoonful is given at a dose once or twice a day, the oil often even controls diarrhœa. In cases of phthisis with diarrhœa, it is a good plan to begin the cod-liver oil with cautiously small doses, and if it suits it may be given with greater freedom. An excellent method is to give a tea-spoonful the last thing at night, immediately before sleep, whe it may often be borne without producing either nausea or dia rhœa, though previously it had occasioned one or both of the symptoms.

In the early stage, as might be expected phthisis is mo benefited by the use of oils.

Phlegmatic persons, with sallow skins and dark complexions, benefit more it is said by cod-liver oil, than persons of sanguine temperament, and florid complexion.

Cod-liver oil is often very serviceable in chronic rheumatism, rheumatoid arthritis, chronic gout, chronic skin affections, syphilitic or otherwise. It is also particularly useful in emphysema of the lungs and chronic bronchitis; in the former checking lung degeneration, in the latter controlling expectoration.

Many persons, especially the aged, complain of much sinking or a sensation of "craving" at the epigastrium, relieved for a short time only by food, a condition sometimes connected with atonic dyspepsia, sometimes dependent on the general state of health. If the intestinal canal is not in an irritable condition, cod-liver oil will remedy this sinking. Middle-aged patients, suffering from that anomalous group of symptoms called hysteria, sometimes complain of the same irksome symptoms. In this case oil will remove the sinking, while it will often simultaneously relieve the other symptoms of the group.

Cod-liver oil and quinine is the best treatment for giddiness in the aged, that is when this symptom is not ascribable to serious organic brain disease, but probably to atheromatous changes in the brain-vessels, or to a weak heart.

Fats are of special use in the chronic diseases of children, arising from mal-nutrition, and any local malady will generally disappear on restoring nutrition and growth to the healthy state.

Cod-liver oil often favourably modifies the course of laryngismus stridulus, rickets, chorea, the middle and after stage of whooping-cough, and chronic coughs.

The obstinate constipation of children sometimes yields to cod-liver oil.

The chronic diarrhœa, of a few pale, stinking, pulpy motions daily will reduce a child a few months old almost to a skeleton The skin becomes leathery and wrinkled, food is perhaps rejected, and when brought to this dangerous pass, thrush breaks out. Whilst combating the diarrhœa or vomiting, a teaspoonful or half a teaspoonful of cod-liver oil given to the child nightly before sleep, gradually increasing the quantity and frequency of the dose will neither increase the vomiting nor the diarrhœa, but on the contrary will promote nourishment, growth, improve the general health, and rescue the patient from a perilous condition.

Hitherto, fats have been spoken of for the most part in common, but they certainly are not all equally useful therapeutic agents.

As we have seen, animal fats are to be preferred to vegetable fats; and liver fats are generally esteemed beyond all others. Whether cod-liver oil is superior to that derived from the livers of other animals is difficult to decide—since much of the cod-liver oil of commerce is procured, not only from the livers of various fish, but likewise, it is said, from those of other marine animals.

The superiority of cod-liver oil has been thought to depend on the minute quantities of iodine, phosphorus, or bile it contains, —a conjecture clearly wrong, for the effect of these substances in disease is dissimilar to that of the oil.

The superiority of liver oils is ascribable to their easy toleration by the stomach. They generally can be taken without inconvenience for months or years, while other fats and oils often produce nausea, loss of appetite, and diarrhœa. There is reason to think that cod-liver oil is more easily absorbed than other oils.

Cod-liver oil at first often excites nausea, vomiting, and disagreeable eructations. Occasionally the difficulty in overcoming the distaste for this medicine is almost insuperable; yet disgust is generally overcome, and in a short time the oil is taken even with relish, and children, indeed, often come to regard it as a treat. Sometimes at the commencement of the course a child becomes languid, appetiteless and appears worse; but usually after a week or ten days, the oil begins to be tolerated, and then improvement sets in.

The nausea and vomiting sometimes caused by this remedy may be produced by too large a dose. At first, a teaspoonful only, or even less is enough, and should the stomach manifest intolerance, one dose only should be given daily, and it is a good practice to give it at night-time, just before lying down to sleep.

Cod-liver oil is often administered in such quantities that i can scarcely be borne even when the stomach is accustomed t it. Weeks, and even, months may elapse, before full doses o oil can be digested and absorbed ; hence, if swallowed in undu bulk, it merely passes off by the motions, and by its decomposition is liable to disorder the intestines. An examination of th motions will shew whether the oil is given in excess.

Cod-liver oil should be taken after food, on orange or ginge wine, or weak brandy and water, or some agreeable bitter lik tincture of orange-peel, and should be so poured as not to touc the glass, but to float on the surface of the wine or brandy as globule and thus tossed off. A little salt taken immediatel before and after the dose often removes the taste and prevent nausea, and it is said that a few drops of ketchup added to th oil will cover its taste.

A mixture composed of equal parts of cod-liver oil and fres mucilage of gum acacia and water, has very little taste, and th addition of two minims of oil of lemons to each ounce of thi mixture, effectually conceals the fishy flavour.

A cod-liver oil jelly has recently been prepared, said to contain 70 per cent. of oil. Bolted like jelly it is almost tasteless.

Notwithstanding such ingenious devices, it is not uncommo to meet with patients who even after repeated trials, canno tolerate the oil on account of the eructations, loss of appetite nausea, or vomiting. In some cases this intolerance is due t dyspepsia ; but it is generally due to that inability to digest an absorb fat so commonly noticed in consumption, even befor its development. This fact has been much dwelt on by Dr Balthazar Foster, who, led by some suggestive experiments o Claude Bernard—in the case of patients intolerant of oil, use ether as a means of assisting the digestion and absorption o fat.

Claude Bernard has shown that the action of ether " is twofold—(1) it stimulates the pancreas and glands of the duodenu to pour out their secretions freely, and (2) at the same time i facilitates the absorption of those very substances which thes secretions are designed to digest. In other words, ether not onl obtains for us the secretions required to digest, but promotes th absorption of these fats when digested." Bernard maintain that fats are chiefly absorbed by means of these secretions. After a prolonged investigation of the influence of ether, Dr.

Balthazar Foster finds that oils and fats which otherwise cause nausea and sickness, are by means of this combination retained and digested, thus increasing appetite, nutrition, and weight. Dr. Foster employs ether purus of the Pharmacopœia in doses of from ten to fifteen minims to every two drachms of oil. The ether may be given either separately or with the oil; but as the ether masks the unsavouriness of the oil, it is better to combine them.

Lime-water mixed with the oil sometimes obviates nausea, and even diarrhœa.

Fats are consumed in the body, but sometimes a small quantity escapes with the fæces and urine. The quantity escaping by the urine is insignificant, except in the disease called chylous urine, when fat is often present in considerable amount. In Bright's disease a little fat is voided with the uriniferous casts in the urine.

CASTOR OIL. CROTON OIL.

These oils consist of a bland oil with a variable quantity of an acrid, irritating, purgative, matter, which imparts to them their characteristic properties. This irritating substance exists in small proportion in castor oil and in a larger degree in croton oil. Croton oil irritates the skin, produces redness, vesication, and with a strong application, even pustulation, followed by scars. The irritating effect is increased by the admixture of alkalies; hence liquor potassæ is sometimes added to intensify the effects of croton oil.

Its action is very variable; several applications on successive days may produce but slight vesication, whilst sometimes a single moderate application sets up great irritation, much vesication, and even pustulation. Caution is therefore needful. When applied too energetically or too persistently, croton oil liniment sometimes produces superficial white round scars, with a hair follicle in the centre. These scars gradually disappear. Croton-oil liniment applied to the chest of phthisical and bronchitic patients is highly esteemed as a counter-irritant, but, owing to the vesication it produces it cannot generally be repeated more than once or twice on successive days and sometimes only one application can be borne. In bronchitis and phthisi croton-oil liniment is sometimes preferred to mustard poultice and indeed certain patients aver that croton oil gives the greater relief than mustard poultices. The vesication, being decided disadvantage, the patient must carefully avoid conveyi any of the croton application to tender parts of the skin, lest should provoke troublesome or severe inflammation of the fa or scrotum. Dr. Tilbury Fox states that croton oil sometim produces a symmetrical erythema of the face, lasting for a fe days, where no direct application of the drug could have o curred; and I too have seen this erythema of the face occur du ing the employment of croton oil. It is hard to say whether th erythema depends on the action of the croton oil after i absorption into the blood, or on the volatile acrid principl reaching the face through the air, or by means of the hands.

As is the case sometimes with iodine liniment and now and the from a belladonna plaster, I have known croton oil linimen produce a crop of itching papules which have spread over th chief part of the body reaching even to the feet.

Pure castor oil is almost tasteless. Croton oil has an acri burning taste.

These oils apart from their acrid principle behave in th stomach and intestines, for the most part, like other oils. Croto oil in a large dose inflames the stomach. If not quickly expelle from the intestines they become absorbed into the blood, an serve the same purposes as other oils.

The acrid matter of these oils, irritating the mucous membran of the intestine, excites slight catarrh, and by this means purge As alkalies intensify the action of the acrid principle, the purgative effect of these oils is heightened by their admixture with th alkali of the bile.

These oils, especially castor oil, are commonly used as purgatives. Castor oil is a speedy, certain, and somewhat mil purgative, producing only, one, two, or three motions, with littl griping. It is said to purge when injected into the veins or eve when applied to the skin; and if this statement is true, the oi must have an especial affinity for the intestines. It is commonl used as a purgative for children, women with child, after parturition, in fever, piles, and fissure of the anus. It is not a goo purgative in habitual constipation, as it increases the torpi habit of the bowels, an effect constantly witnessed in children.

Croton oil is a powerful purgative, producing watery stools, with much depression. It is an uncertain purgative, sometimes acting in half an hour, at other times requiring much longer; large quantities, even six or eight drops, may be required; hence it is seldom used, unless, as in apoplexy, coma, and mania, when it is important to administer a purgative of small bulk. It is sometimes employed in obstinate constipation when other purgatives have failed. It is a good plan to give a quarter or a third of a minim every hour, by which means a much smaller total quantity often succeeds better than a larger quantity given in one dose. Owing to its acrid taste it is generally administered in the form of pill, except to patients in a state of insensibility, when it is mixed with a little butter or lard, and conveyed to the back of the tongue, and is swallowed involuntarily, or trickles down the throat.

Röhrig, from experimental evidence, is led to conclude that Croton oil given to fasting animals is a powerful stimulant of the liver.

As these oils remain but a short time in the intestines, the greater part passes out with the motions. Probably little of the acrid matter passes into the blood, since unless croton oil is swallowed in large quantity, those serious symptoms, seen after its injection into the veins do not occur.

Like other purgatives these oils may influence distant organs, as the kidneys, and act as diuretics.

Croton oil has been used in hydrocephalus, and it is said to have removed the excess of fluid from the ventricles of the brain.

Mr. Sewell, of Ottawa, Canada, recommends croton oil in sciatica, obstinate pleurodynia, and crick of the neck, and he states that other purgatives cannot be effectively substituted for croton oil. He lays great stress on the evacuation of blackened fæces. No doubt some cases of sciatica, depend on a loaded rectum or descending colon, when any purgative will be useful; but apparently these are not the cases referred to by Mr. Sewell. This treatment sometimes relieves or even suddenly cures unconstipated patients but it produces a good deal of temporary weakness.

Diarrhœa in children sometimes yields to eight or ten drops of castor oil suspended in mucilage, but unfortunately the indications for this treatment being unknown it often fails.

In the early stages of diarrhœa it is a common practice to administer a dose of castor oil, to carry away the irritant exciting the discharges.

A drop of castor oil introduced into the eye will often allay pain and intolerance of light produced by a fine irritant, as sand.

Castor oil may be taken, almost if not quite tastelessly, in beef-tea highly peppered and well-salted; or the oil may be beaten up with an equal quantity of the froth of porter, and tossed off before the constituents have separated. A mixture consisting of castor-oil, half an ounce; fresh mucilage of acacia, three drachms; distilled water, five drachms, has very little taste. It may be flavoured with oil of peppermint or oil of lemons. It is a good plan to pour into a wetted glass the required dose and then toss it off without letting the oil impinge upon the teeth.

GLYCERINE.

The applications of glycerine are endless. It is a useful application for chapped lips and hands; and for rough furfuraceous, and inelastic skin, left after eczema, or other skin complaints. It restores suppleness to the tissues, and allays burning, tingling, and smarting. Undiluted glycerine may cause inflammation and smarting, hence it should be mixed with an equal quantity of rose-water or eau de Cologne. Glycerine of starch acts still better in rendering the skin soft and supple. In xeroderma a bath should be taken daily, and the ointment rubbed in after wiping the body thoroughly dry. Glycerine is a good application for dryness of the meatus of the ear; and when the tympanum is ruptured it covers the opening in the tympanum with a thin film, supplying for a time the place of the lost membrane.

Dr. M. Rosenthal recommends glycerine as a solvent for alkaloids employed hypodermically. One drachm of glycerine will dissolve ten grains of muriate of morphia, twenty grains of sulphate of quinia, and only one grain of curare.

The lips, tongue, and gums, when dry and coated with dried mucus in acute diseases, should be washed and kept moist several times a day with glycerine, which greatly improves the comfort and appearance of the patient. If the sweet taste of erine is unpleasant, it will answer as well if diluted with an l quantity water or lemon juice.

n the last stage of chronic diseases, as phthisis, when the mus membrane of the mouth becomes dry, red, shiny, and glazed, ondition which causes much distress, and is usually accomnied by great thirst, a wash of glycerine and water to rinse e mouth, will relieve this harassing condition. Undiluted, ycerine is apt o make the mouth clammy and sticky. Glyrine will sometimes cure thrush.

Glycerine of carbolic acid is a useful application to fœtid sores d open cancers f the surface of the body or of the uterus. It moves the offensive odour of the discharge, and improves the ndition of the sore.

A pledget of cotton wool saturated with glycerine and applied r several hours the congested neck of the womb will induce copious serous discharge and will give as much relief as the plication of leeches. The pledget should be fastened with a iece of twine so that the patient herself can readily withdraw it.

Glycerine of borax is a good application in pityriasis of the scalp, aphthæ, and thrush.

Glycerine is much used now in the manufacture of medicated pessaries.

Glycerine has been used in place of sugar, as in diabetes. It has also been recommended as a substitute for cod-liver oil but experience has shown its inferiority.

One of the best preventives of bed-sores is glycerine or glycerine cream. The part exposed to pressure should be washed morning and evening with tepid water, and carefully dabbed quite dry with a soft towel, and then gently rubbed over with a little glycerine or glycerine cream. If the skin is sore or tender, the glycerine cream is best. A draw-sheet made of linen, and sufficiently large to be firmly tucked in at both sides of the bed (as any folds or creases are very apt to produce tenderness and eventually, sores) will prevent soiling of the bed-clothes. This preventive treatment should be commenced before the on-coming of redness or tenderness.

It is impossible here to indicate all the manifold uses of glycerine.

ON DIFFERENT KINDS OF TANNIN.
ON GALLIC ACID.

These substances produce little or no change in the unbroken skin, but act as astringents to sores and mucous membranes, checking secretion by contracting the vessels and condensing the tissues. They precipitate albumen and thus coat over wounds, in some measure protecting them from the injurious action of the air, whence tannin-containing substances are applied to excoriations, profusely-discharging sores, and luxuriant granulations. Tannin is conveniently employed in the form of glycerine of tannin. This combination is useful in ozæna. After measles, scarlet fever, and some other diseases, the inside of the nose not uncommonly becomes excoriated and reddened, and discharges freely a thin sanious or thicker purulent fluid, which, on drying, scabs up the nose, and often excites eczema of the upper lip; now if the inside of the nose is well brushed out with glycerine of tannin, the discharge will cease, even after a single application; but if the scabs are thick, they must be thoroughly removed to enable the application to act on the sore secreting surface. Glycerine of tannin cures syphilitic ozæna of children; it arrests the discharge, reduces the swelling of the mucous membrane which produces the characteristic sniffling, and by enabling the child to breathe through the nose, permits sound refreshing sleep and proper suckling.

Occasionally among adults we meet with an impetiginous eruption of the inside of the nose, most severe near the orifice where the hairs grow, but extending higher in a milder form. Scabs block up the nose, especially at night, and the alæ, and sometimes the whole of the nose, is thickened, dusky red, and very painful. The swelling may extend to the adjacent structures, and may merge into repeated attacks of erysipelas of the face. Glycerine of tannin, applied once or twice daily to the whole cavity of the nose, speedily reduces and even cures this disease. The upper part of the nose is the most easily cured, but the disease situated in the hairy part is much more obstinate, and is very prone to recur again and again. Epilation is useful in obstinate cases. Glycerine of starch or zinc ointment, applied several times a day, keeps the tissues moist and supple, and is a serviceable supplementary application.

Glycerine of tannin will generally check the nasal discharge of thick, lumpy, greenish-black, and stinking mucus, and even when it fails it ordinarily removes the offensive smell. In other forms of ozæna, especially when the disease affects the upper and back part of the nose with its numerous recesses, it is preferable to flush the nose with a deodorizing and astringent wash, in the way described which besides benefiting the mucous membrane, washes away the inspissated putrefying discharge on which the stench of ozæna generally depends.

Glycerine of tannin is very valuable in otorrhœa, a common complaint of weak unhealthy children after severe illnesses. The external meatus must be filled with it, and retained there by cotton wool. One application usually suffices, but a slight discharge may remain, or return in a few weeks, when a repetition of the treatment is called for. This treatment is inapplicable in the acute stages of inflammation of the meatus. This affection is much more difficult to cure when the tympanum is destroyed and the small bones are exposed; indeed in such cases the tannin only restrains and deodorizes the discharge, which generally returns when the application is stopped. Glycerine of tannin will often cure the chronic vaginitis of children, a complaint generally more obstinate than either ozæna or otorrhœa.

Glycerine of tannin is useful in some stages of eczema. After the removal of the scales, if the inflamed, red, swollen, and weeping raw surface is painted with this preparation, it notably abates the discharge, redness, heat, and swelling. A poultice must be applied at night; if the glycerine of tannin excites much pain, the poultices must be continued night and day. In a less active stage, when the tissues are not so red, swollen, and weeping, eczema yields still more readily to glycerine of tannin, applied twice or thrice daily. A poultice is useful at night. Tannin-glycerine quickly allays the troublesome itching, tingling, and burning, so common in eczema; hence it prevents tearing with the nails and rubbing, which hinder healing, nay, even cause the eczema to spread. It may not entirely remove the disease, but only reduce it to the desquamative stage, with a tendency to crack and ooze, when tar, carbolic acid, or other ointments become necessary to complete the cure. The same treatment is useful in impetigo. A poultice must be applied each night to remove the scabs, and the tannin application should be employed during the day. While treating these skin diseases the state of the digestive organs must not be overlooked.

Eczema of the ears, common in middle-aged and old people readily yields to glycerine of tannin, unless the inflammation runs high with great swelling, heat, and weeping. This remedy is also very efficacious in eczema behind the ears of children one or two applications speedily drying up and healing the eczema although it may have lasted for weeks or months. The gums must be lanced, if red and swollen, and other irritations removed.

Glycerine of tannin sometimes benefits intertrigo.

Glycerine of tannin is very useful in many throat diseases. Immediately after acute inflammation, when the mucous membrane grows less red, less swollen, becomes moister, and is covered with mucus or pus, glycerine of tannin painted on the pharynx, hastens recovery, prevents chronic inflammation with relaxation of the mucous membrane, which often follows the acute disease, heals superficial ulcerations, occurring as the acute inflammation subsides, and cures hoarseness.

Glycerine of tannin is useful on the appearance of ulceration in aphthous sore throat. In chronic inflammation of the throat, when the mucous membrane is relaxed, swollen, granular-looking, and covered with mucus or pus, a few applications of glycerine of tannin brace up the tissues and lessen or remove the hoarseness. This kind of throat, often with slight enlargement of the tonsils, is common in children, and sometimes produces deafness, and still more often a frequent hacking cough, which may keep the child awake the greater part of the night. In children, this is so commonly the cause of cough, that it is well always to examine their throats. Glycerine of tannin applied daily speedily allays the cough, and cures the deafness. Throat deafness is the most common form of that infirmity in childhood; and when not due to enlarged tonsils, generally depends upon the kind of morbid throat just described.

Many coughs depend on the state of the throat, a fact, accepted in theory, but little regarded in practice. Glycerine of tannin is very useful to allay the cough and frequent deglutition excited by an elongated uvula, and the frequent hacking cough in phthisis, due to inflammation or ulceration of the throat. A good night's rest may be often obtained by painting the throat shortly before bed-time, and a small quantity of morphia added to the glycerine of tannin increases its soothing effect. Mopping the pharynx, epiglottis, and adjacent structures with this application will much reduce the frequency and violence of the paroxysms of whooping cough. It is of little use if the case is complicated with catarrhal or other inflammation of the lungs, tuberculosis, or any irritation, as that from teething; but in simple uncomplicated whooping cough it is very useful. The paroxysmal cough often left by whooping cough, which readily returns on catching cold, yields to this treatment. In whooping cough and the foregoing throat diseases, glycerine of tannin is better than a solution of nitrate of silver, as it excites less pain, and is less disagreeable to the taste, (see Nitrate of Silver). Glycerine of tannin is more efficacious then tannin lozenges.

Glycerine of tannin is useful in ulcerative stomatitis, especially in that form affecting only the edges of the gums; but dried alum is a better application. (See Salacine).

In diphtheria and croup, Trousseau successfully employed a solution containing five per cent. of tannin, in the form of spray, several times a day, for fifteen or twenty minutes.

Tannin unites with albuminous matter in the stomach, forming an insoluble substance, and any tannin left uncombined constringes the mucous membrane, and lessens its secretions. As tannin likewise diminishes the solvent power of the gastric juice, it is inadvisable to give tannin-containing substances close to meal times.

It is asserted that tannin, by virtue of its astringency, cures slight catarrh of the stomach; hence tannin preparations are occasionally employed in irritative dyspepsia. Some give tannin for pyrosis, but they do not discriminate whether it checks neutral, alkaline, or acid pyrosis, or all these forms of the complaint. In poisoning by alkaloids, as strychnine and morphia, tannin is given to render them less soluble. Tannin and gallic acid control bleeding from the stomach. The members of this group are astringent to the intestines, lessening their secretions and probably their contractions; hence they constipate, and tannin-containing substances, as catechu, kino, red gum, rhatany, and hæmatoxylum, are very useful in most forms of acute and chronic diarrhœa. The members of this group are employed as anal injections to check diarrhœa, to destroy thread-worms, and to restrain prolapsus ani.

Few applications are so useful in irritable piles as gallic acid and opium ointment. The combination quickly relieves pai[illegible] and after a time even reduces the size of the hæmorrhoid[illegible] tumours. Calomel ointment too is highly spoken of by [illegible] friend Mr. I. Bartlett.

Owing to their low diffusion-power the members of this group must pass but slowly from the intestines into the blood. After, if not before absorption into the circulation, they must become neutralized with albumen, and for this reason some authorities maintain that tannin and its allies do not act as astringents to organs distant from the intestines. Nevertheless, tannin and gallic acid are frequently employed with considerable benefit to check bleeding from the lungs, uterus, and kidneys, and with less apparent benefit to check over-abundant secretion of milk, and profuse sweating.

Tannin is sometimes administered to diminish the loss of albumen in chronic Bright's disease, and George Lewald has exprimentally tested its power in this respect. In a few carefully-conducted experiments, he found that the albumen was always lessened to an inconsiderable amount, the daily average diminution amounting to about 0·66 grammes. Tannin produced a much more decided increase in the quantity of the urine.

An injection of glycerine of tannin is very beneficial in the after-stages of gonorrhœa, and in gleet, but, as the undiluted preparation commonly excites much pain, it should be mixed with an equal quantity of olive oil or mucilage. Two drachms of this mixture is enough for each injection. Too much will excite frequent and painful micturition. This injection often speedily cures gleet, but, like other injections, the discharge in many instances ceases only during its employment. Urethral injections should be persevered with eight or ten days after the cessation of discharge and as they are apt to excite seminal emissions should not be employed at bed-time.

Tannin, either alone, or blended with other astringents, is a useful injection in leucorrhœa. In obstinate cases, and when the os uteri is ulcerated, a suppository of tannin and cocoa-nut fat applied to the mouth of the uterus is very beneficial. Glycerine of tannin checks the great discharge of cancer of the uterus, and destroys the stench; but a mixture of glycerine of tannin and glycerine of carbolic acid is still more useful.

The effect of the members of this group on the natural constituents of the urine is unknown. Gallic acid "passes unchanged into the urine, and has been detected one hour after being taken." Tannic acid "passes off by the urine in the forms of gallic and pyro-gallic acids, perhaps of a saccharine body." (Parkes).

HAMAMELIS VIRGINICA.

VARIOUS preparations of the witch hazel have long been in vogue in America among the natives who introduced it to the English settlers.

It is chiefly employed in hæmorrhage, and is most serviceable in passive hæmorrhage. Dr. Preston has employed it largely and successfully in epistaxis, and his experience is confirmed by that of many other writers. It has been recommended highly in the hæmorrhagic diathesis, but in the case of a lad with this peculiarity I employed it in vain on several occasions in nose-bleeding. It has been found very serviceable in hæmoptysis and hæmatemesis. Dr. Hall recommends it in dysentery when the discharges contain much blood. I have known it arrest hæmaturia in four cases which had resisted many other remedies. It is very highly recommended in piles both to check bleeding and to cure the diseased veins, and I have found it singularly successful and prompt in arresting this form of bleeding, even when amounting to half-a-pint a day, repeated almost daily for months or years. It should be employed either as a lotion, injection, or cerate, in piles, as well as by the mouth. It has been recommended in varicocele, and one case I have seen in which during the employment of this drug the varicosities entirely and apparently permanently disappeared.

Dr. Preston extols it in phlegmasia dolens. I have found it useful in checking that slight oozing of blood after a confinement which may go on sometimes for weeks.

The dose is one or two minims of the tincture every two or three hours, large doses being liable to produce severe throbbing pain in the head.

TAR, CREASOTE, CARBOLIC ACID, PETROLEUM, OIL OF TAR, &c.

Carbolic Acid destroys the lowest forms of animal and vegetable life, and prevents fermentation and putrefaction. Whilst it prevents the fermentation of sugar, it is said not to prevent the conversion of starch into sugar nor the decomposition of amygdalin. It is largely employed to prevent the stenches of drains, water-closets, dissecting rooms, and hospital wards. Unlike chlorine and permanganate of potash, carbolic acid is incapable of destroying offensive gases; it only prevents their formation. Its destructive influence over the low forms of animal and vegetable life has led to its being considered a disinfectant, but no satisfactory proof exists of its capability to destroy the contagious elements of disease. Nevertheless it is extensively, and apparently effectually, employed as a disinfectant. It is a good plan to hang a sheet, kept moist with a solution of carbolic acid, and large enough to cover the doorway of the sick chamber and to extend a little beyond.

Creasote and carbolic acid act energetically on the skin, producing opaque white patches, and exciting active inflammation, followed in a few days by desquamation. They coagulate albumen, and are stimulant and astringent: hence they may be employed to check bleeding.

According to Dr. J. H. Bill, carbolic acid locally applied is an anæsthetic, a statement confirmed by Dr. Andrew H. Smith *(New York Medical Journal).* Dr. Smith painted on his forearm a spot an inch in diameter, with an 85 per cent. solution of carbolic acid. For a minute it caused slight burning, then the skin became quite numb, whitened, and shrivelled; at this point he made an incision half an inch long without even feeling the knife, the wound healing as usual. Three hours afterwards, he thrust, without pain, a needle into the skin, and next he applied a blister to the carbolised skin without causing pain or vesication. He found that in incising two whitlows this application greatly lessened the pain.

Professsor Erasmus Wilson employs carbolic acid as an anæsthetic, to diminish the pain arising from caustics, as potassa fusa. Brushed over the delicate part or raw surface several times, the acid coagulates the albumen, "benumbs the surface and permits the caustic action with a great reduction of pain." Mr. Wilson employs this method in lupus, epithelioma, and in disease of the glans and prepuce.

Carbolic acid applied as a stimulant and antiseptic to gangrenous and ill-smelling sores prevents the stench and improves the condition of the wound.

Professor Lister employs carbolic acid largely in the treatment of wounds. His views may be briefly summarized, thus:—When blood is effused into healthy tissues, it is generally absorbed, exciting no inflammation, suppuration, or fever; if however, the skin is broken, so that the wound communicates with the air, the effused blood quickly decomposes, exciting both inflammation and suppuration. These phenomena are not excited by the air itself, but by the organic germs floating in it, so that if the air coming into contact with the wound can be freed from germs, then neither putrefaction of the blood, nor the consequent inflammation and suppuration can take place; moreover, experiments show, that if these germs are prevented reaching wound or abscess, their granulations and walls will not form pus, but only a little serum. Now, as carbolic acid completely destroys these organic floating germs, he filters the air before it reaches the wound, through dressings impregnated with this agent.

Senator (*Centralblatt*, Jan. 25, 1873), finds that pus from wounds or ulcers treated by Lister's methods, when injected under the skin of dogs, does not produce any symptoms, whilst pus in the same quantity from wounds not so treated, unfailingly excites fever for many days.

Concerning contused wounds, Lister says, "All the local inflammatory mischief and general febrile disturbance which follow severe injuries, are due to the irritating and poisoning influence of decomposing blood or sloughs. For these evils are entirely avoided by the antiseptic treatment, so that limbs which otherwise would unhesitatingly be condemned to amputation may be retained, with confidence of the best results."

To destroy any septic germ already in contact with the lesion, Lister first washes the wound thoroughly with a watery solution of carbolic acid, containing, for contused wounds, one part of crystallized carbolic acid to twenty of water, and one part to forty for simple incised wounds. To prevent the subsequent access of septic germs, he formerly covered the wound with a piece of lint or linen soaked in a solution of carbolic acid and olive oil, carefully strapping down its edges with plaster; but he now covers the wound with a lac plaster,* extending "freely beyond the wound at every part, so that the discharge may have to travel a considerable distance beneath the impermeable antiseptic layer." The greatest care is necessary in changing the dressing, especially with contused wounds. "For the antiseptic injected into the wound on the previous day having been absorbed, the extravasated blood and any portion of tissue killed by the violence of the injury, are as susceptible of putrefaction as if no such treatment had been pursued."

Lister, counselling adherence to the minutest details of his plan, observes that "experience leads him to believe that, if, when the dressings are removed, a single drop of serum were to be pressed out by the movement of the limb, and then regurgitate into the interior after being exposed, even for a second, to the influence of septic air, putrefaction would be pretty certain to occur." In redressing a wound he recommends "the employment of a syringe, the muzzle of which is inserted beneath the margin of the lac plaster, and as this is raised, a stream of watery solution of carbolic acid (one to forty) is made to play upon the wound till a piece of calico soaked with the same solution has been placed upon it." Any examination of the wound that may be desired is made with freedom through the transparent solution thrown over it by the syringe." Lister changes the dressing on the day following the injury, but afterwards the frequency of the dressing must be regulated by the amount of discharge. After the first day or two he protects the wound from contact with the carbolic plaster, to prevent irritation of the delicate structures and the formation of pus. He says, "after the first dressing, the object I always aim at is to have the material in contact with the exposed tissues approximate as closely as possible to the perfectly bland and neutral characters of the living healthy tissues." The material placed between the wound and the carbolic plaster he terms "the protective." "It is essential that the protective should be antiseptic at the moment of its application, otherwise there will be a risk of its communicating septic germs." The protective he employs is made of oiled silk "brushed over with a mixture of one part of dextrine, two parts of powdered starch, and sixteen parts of cold watery solution of carbolic acid (one to twenty). The carbolic acid solution is used rather than water, not for its antiseptic property, but because it makes the dextrine apply itself more readily to the oiled silk, and the granular starch is used for a similar purpose." Oiled silk thus prepared becomes uniformly moistened when dipped in a watery solution of the acid, so that all risk of communicating putrefactive mischief along with it is avoided." The protective must be everywhere well over-lapped by the antiseptic lac plâster.

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* This plaster is made with a mixture of three parts shellac to one of crystallized carbolic acid. This mixture "is incorporated with a soft cloth instead of being spread upon starched calico. It is thus rendered beautifully flexible, and at the same time much more durable." "As in this form it is very thin, it is well, where much discharge is anticipated, or where a long time is intended to elapse between the dressings, to use it in two layers." The plaster can be obtained of the old Apothecaries' Company, Glasgow.

When this treatment is adopted after an operation, the ligatures should be cut short, and left in the wound, or the arteries closed by torsion.

Lister treats abscesses by a modification of the foregoing plan. The incision is made whilst the spray (two per cent. watery solution of carbolic acid) is playing upon the surface of the abscess; the pus is then to be thoroughly squeezed out. The further dressing is to be conducted as with an incised or contused wound. If the discharge from the abscess is very abundant, the dressing must be changed every twelve hours.

This treatment, Lister says—and my experience fully bears him out—prevents, in some instances, suppuration in the cavity, the old stimulus being removed, and the new one of decomposing matter prevented. With small abscesses this favourable termination is indeed the rule, and, with large and even enormous abscesses; psoac and iliac, but little fresh matter is formed, and the patient is thus preserved from the exhausting effects of an abundant and prolonged discharge. So striking are the good effects of this treatment, that in twenty-four hours the discharge often ceases to be puriform, and the walls of the abscess quickly unite. The dressings must be continued till the wound has quite healed, and on no account must the lint be raised to inspect the wound unless protected by the spray, since such perverse curiosity will certainly ensure the complete failure of the treatment.

Professor Lister says it is of no consequence whether the opening into the abscess is dependent or not, as the contracting pyogenic membrane soon obliterates the cavity. It may not be out of place again to insist that the success of this treatment depends entirely on the rigorous care taken to carry out Lister's directions in order to prevent the passage of any septic germs into the wound.

Professor Lister has recently introduced a modification of his treatment of wounds. The superiority of oakum dressings, in some respects, to his antiseptic applications led to these improvements.

Lister says "Having heard reports from various quarters of the efficacy of oakum, I have lately put it to the test with granulating sores, and I have found it more than answer my expectations. The reason for its superiority over oily cloths is readily intelligible. Each fibre of the oakum is imbued with an insoluble vehicle of the antiseptic; so that the discharge in passing among the fibres cannot wash out the agent any more than it can when flowing beneath the lac plaster, to a narrow strip of which an individual oakum fibre is fairly comparable.

"Oakum not only proved efficient antiseptically, but presented several advantages over lac plaster. When the latter is left as a dressing for several days together, the discharge, even though small in amount, soaking into the absorbing cloths, loses the carbolic acid it had received from the plaster, and, putrefying from day to day, assumes an acrid character, and sometimes produces most troublesome irritation of the skin. This is, of course, avoided by the oakum. Again, the lac plaster, being quite impermeable to watery fluid, keeps the skin beneath it moist, and, in fact, covered with a weak watery solution of carbolic acid, which, I suspect, insinuates itself, more or less, beneath the protective, and maintains a slight stimulating influence upon the parts beneath it. But oakum, draining away the discharge as fast as it is effused, avoids this source of disturbance. The result is, that if a granulating sore is thoroughly washed with an antiseptic lotion, and covered with 'protective' and a well-overlapping mass of oakum secured with a bandage, a dressing is provided which nearly approaches the ideal I have long had in view. For, as granulations do not form pus, or even exude serum except when stimulated, a persistent antiseptic, combined with an efficient protective, should constitute a more or less permanent dressing, under which discharge should cease, and cicatrization proceed with great rapidity. Accordingly, ulcers of the leg treated in this way have been found, when exposed after the lapse of several days, either entirely healed or greatly advanced in the process, while the moisture beneath the protective has been of a serous character, and the discharge collected in the oakum comparatively small in amount. Lastly, the lac plaster has this further disadvantage from the moisture beneath it, that it prevents efficient strapping in cases that require it. But under oakum an adhesive plaster retains its hold as well as under dry lint."

He now uses a folded muslin cloth of open texture, imbued with a mixture composed of sixteen parts of paraffin, four parts of resin, and one part of crystallised carbolic acid.

"Cheap muslin gauze dipped in the melted mass, and well wrung or pressed while hot, is an elegant and convenient form of modified oakum. It should be folded into about eight layers; and in order to prevent the discharge from soaking too directly through it, a piece of thin gutta-percha tissue may be placed beneath the outer layer to guide the fluid towards the edge of the cloth."

The empyreumatic oils and their derivatives are very useful in many chronic skin affections, as chronic eczema, psoriasis, erythema. The odour of oil of cade or oleum rusci is less disagreeable than that of tar, liquor carbonas detergens, and carbolic acid. Dr. McCall Anderson strongly recommends these oils, especially liquor carbonas detergens, oil of cade, and oleum rusci. In most cases they afford immediate relief from the tormenting itchting of chronic eczema, psoriasis, erythema, and prurigo, but if too long continued, they excite inflammation of the air follicles, forming papules and pustules, with a black spot in their centre. Hebra terms this eruption tar-acne. They often excite considerable inflammation in delicate skins. The topical effect of the vapour even sometimes produces acne. The parts protected by clothes escape, showing that this effect is not induced through absorption by the lungs.

These oils are useful in chronic eczema, after the subsidence of inflammation, especially when only a little redness, itching, and some desquamation remain. Sometimes pure tar succeeds better than its ointment, but if there is inflammation, or if the surface is raw and weeping, it will then excite great pain and inflammation. In some instances the application of undiluted petroleum much improves local forms of eczema, as that kind occurring on the back of the hands; but as this is generally very painful, other and milder remedies should first be tried.

Provided inflammation runs not too high, carbolic acid ointment, composed of ten minims of the acid to an ounce of lard, moderates the weeping stage of eczema and allays the tingling and itching. It is useful in the eczema of the head of children.

The external application of these remedies in psoriasis is often very serviceable. Tar, or its ointment, seldom fails to benefit chronic psoriasis; and some of the most obstinate forms of this disease may often be cured by painting the patches of the eruption with pure undiluted tar allowing it to remain till it wears gradually away. If the unsightliness of the tar ointment is objectionable, the creasote ointment composed of two or three parts of creasote to one part of white wax recommended by Mr.

Squire, may be substituted. This powerful ointment must be applied only to the patch of psoriasis, not on the adjacent healthy skin, otherwise it will blister. To avoid staining exposed parts, Dr. McCall Anderson sponges the eruption three or four times daily with a wash composed of crystallized carbolic acid, two drachms; glycerine, six drachms; rectified spirits, four ounces; distilled water, one ounce. But he considers carbolic acid inferior to tarry preparations. He strongly insists on the necessity of rubbing in the ointments till they have nearly disappeared, and, lest they become rancid, of washing them off with soap and water before each fresh application.

Petroleum soap, cade soap, and carbolic soap, are useful in both chronic eczema and psoriasis. As these soaps are made of different strengths, if one kind prove too strong and irritating, a milder form may be substituted. Doctors, especially accoucheurs and surgeons, use carbolic soap, to free their hands from infectious or noxious matters which might endanger their patients safety.

Carbolic acid has the great advantage of being free from colour. It is useful in eczema, psoriasis and prurigo, but is generally considered inferior to tar.

Dr. Eade recommends the use of carbolic acid for carbuncles and carbuncular boils. He employs a solution one part of carbolic acid in four of glycerine or oil, and soaks in this, small pieces of lint, and thrusts them through the opening of the broken skin to the bottom of the holes and sinuses in the carbuncle, and keeps the surface of the carbuncle covered with lint soaked in the solution. This application he maintains prevents the extension of the carbuncle. This treatment is only useful in that late stage of the carbuncle, when the skin is broken and the carbuncle discharging.

A weak solution of carbolic acid is a very useful injection or wash for the cavities of large abscesses, or in empyema, after the evacuation of pus. A like injection will correct the fœtor arising from cancer of the womb, or other uterine diseases. Carbolic acid, it is said, will remove the stench and lessen the discharge in ozæna.

A lotion consisting of one part of carbolic acid to one hundred parts of water is strongly recommended in pruritus ani. Dr. J. Thompson employs marine lint soaked in carbolic lotion. He pushes every night a small plug into the anus, a part being left as a pad outside. Carbolic acid is useful in pruritus pudendi. It may cause considerable irritation both in pruritus ani and pudendi, the skin sometimes being so delicate that even a weak application causes considerable burning and smarting.

The inhalation of creasote or carbolic acid, ten to twenty drops in boiling water, is useful in bronchitis, lessening in some cases over-abundant expectoration. It will generally remove the breath fœtor occasionally met with in bronchitis, and sometimes even the fœtor due to gangrenous lung. The inhalation of even ten drops produces in some persons giddiness and sensation of intoxication. (See Salicine).

Creasote, mixed either with tannin or opium introduced into the hollow of a decayed and painful tooth, often gives relief.

A creasote or carbolic gargle or wash proves very efficacious in sloughs of the mouth or throat, removing the offensive odour, and producing a healthier action in the sore.

Small doses of creasote excite no particular symptoms in the stomach, but a large quantity produces a sensation of burning at the epigastrium, with nausea and vomiting.

During its transit through the intestines, creasote appears not to undergo any change in composition, as its characteristic odour may be detected in every part of the canal. It checks the vomiting of various diseases, as that of pregnancy, sea-sickness, cancer, ulcer of the stomach, Bright's disease. It often promptly relieves stomach pains occurring after food.

The investigations of Dr. Sansom, who first employed sulpho-carbolates in medicine, prove that these salts arrest fermentation in different degrees, sulpho-carbolate of soda being most efficient, then follows a salt of magnesium, then of potassium, then of ammonium. Administered to animals, they prevent putrefaction and decomposition of urine, although Sansom could not detect any of the salt in this excretion. He gave sulpho-carbolate, and then collected and preserved the urine, which after six months had not undergone decomposition.

Sulpho-carbolate of soda and carbolic acid are very useful in flatulence, especially when there is great distension, unaccompanied by pain, heartburn, or other dyspeptic symptoms. Sulpho-carbolate of soda will generally relieve extreme flatulence, producing copious eructations and considerable distention, symptoms not uncommon in middle-aged women and phthisical patients. When flatulence occurs immediately after a meal, ten or fifteen grains of sulpho-carbolate of soda should be taken just before food; when it occurs sometime after meals, the medicine in the same dose should be taken half an hour after food.

We often meet with patients, generally women, who suffer from what is ordinarily called "spasms." The patient complains of considerable flatulence and distension, often limited to one part, or sometimes most marked in one part, of the abdomen, generally on the left side under the ribs, accompanied by severe pain, which like the flatulence itself is often most marked under the left side of the chest. The pain, temporarily relieved by the eructation of a little wind, soon returns and may endure many hours, and may frequently recur. In some cases the complaint is evidently a neuralgia of some of the abdominal nerves; the pain being chiefly excited by flatulence. Sulphocarbolates often afford considerable relief, by preventing the formation of wind, but in some cases I have found phosphorus far more prompt and its remedial effect more permanent.

Creasote has been given in cholera and typhus fever, but apparently without much benefit.

Creasote passes into the blood, and its odour is detectible in most of the organs, showing that it probably remains in chief part, if not entirely, unaltered in the blood.

Tar, creasote, and carbolic acid have been given in bronchitis and in phthisis to check both the quantity of the expectoration and its offensiveness. Tar-water is an old-fashioned and approved remedy in bronchial complaints. The frequent and popular use of tar-water, both by the profession and by the laity, in France and Belgium, led me, in conjunction with my friend Mr. Murrell, to try its effects. Patients so susceptible to cold, that they were obliged to remain indoors the whole winter, informed us that this remedy curtailed considerably the duration and lessened the severity of their catarrhal attacks, and that, by an occasional recourse to the tar, they became less prone to catch cold, and could more freely expose themselves to the weather.

We employed tar in two-grain doses, in a pill, every three or four hours. From October to January, inclusive, we carefully watched its effects on twenty-five patients, whose ages varied from 34 to 70, the average being 44. All these patients had suffered for several years from winter-cough, lasting the whole winter. They were out-patients, and visited the hospital weekly, or oftener. Most of them were much exposed to the weather, whilst some being so ill, were obliged to stop work, and, therefore, were less exposed.

These patients suffered from the symptoms common in winter-cough—paroxysmal and violent cough, the paroxysms lasting from two to ten minutes, recurring ten to twelve times a day, and in the night, spoiling sleep. The expectoration, frothy and slightly purulent, was generally rather abundant, amounting in some cases to half-a-pint or more in the day. The breathing was very short on exertion, but most of them could lie down at night without propping. The physical signs showed a variable amount of emphysema, with sonorous and sibilant rhonchus and occasionally a little bubbling rhonchus at the base.

These patients usually began to improve from the fourth to the seventh day; the improvement rapidly increased, and, in about three weeks, they were well enough to be discharged. The improvement was so decided that the patients returned to their work; even those who in previous years had been confined to the house the whole winter. The cough and expectoration improved before the breathing. In several cases, the expectoration increased during the three or four first days; but its expulsion became easier, and, with the improvement in the cough and expectoration, appetite and strength returned.

On discontinuing the tar, a relapse, often occurred in a week or two, and the patient returned with a request for more of the same medicine, and then, a second time, the symptoms quickly subsided. We found it useless in brcnchial asthma, and its effects were more evident in cases where expectoration and cough were more marked than dyspnœa.

We have no doubt that tar is a good, useful, though, perhaps, not a striking, remedy in these troublesome affections; and certainly it is more efficacious than the drugs generally employed.

It may be remarked, that tar is useful in the same cases for which the spray of ipecacuanha wine is serviceable. The spray, we find, acts much more quickly, and, unlike tar, it lessens dyspnœa even before it improves cough or diminishes expectoration. [See Ipecacuanha.]

In winter-cough and chronic bronchitis, creasote in two minim doses, either in pill or mixture, or floating on an ounce of water is said to be efficacious.

Dr. Anderson gives tar in chronic eczema. He begins with three or four minims in treacle, pill or capsules, g creasing the dose to ten or fifteen minims three tin In grangrene of the lungs, creasote is employed to c fœtor of the expectoration, and as an inhalation it cei ceeds, though when swallowed it is of doubtful effica Salicine.]

Oppression of the head, epigastric pain, vomiting o oured fluid, and black motions sometimes occur after t tion of tar, though rarely except when applied over a

Carbolic acid is readily absorbed by the skin. Inte even externally it may, even in small quantities, pro times serious symptoms, some being affected much m than others; it may excite severe vomiting, giddiness even coma, or collapse, with weak pulse and cold sweat, which disappear in from fifteen minutes to an hour. symptoms arising from carbolic acid are, it is said, be by the free use of diluents; so doubtless the sympto from tar would be benefited by the same means.

Tar and creasote are reputed to be diuretics; and, the ingredients of tar pass off with the urine, changing and odour, they may possibly act on the urinary tract. creasote, and carbolic acid, administered either int applied externally, cause sometimes at first dark-col sometimes black, urine, which gradually becomes ligh It is said that the urine is coloured dark more frequ the external than from the internal use of carbolic Ferrier suggests that this is owing to its becoming oxid its absorption. Sometimes the urine is natural in co first passed, but becomes dark on standing. On the sulphuric acid the odour of tar is readily perceived, ar of iron developes a beautiful blue colour. The local ol fagi, ol rusci, ol cadini, occasionally affect the uri same manner. The urinary changes are especiall within the first few days, but after a time these chan scarcely perceptible. The urine remains clear tl rarely contains albumen, and does not exhibit an iron, showing that the discolouration is not due to rated blood corpuscles. The urine, in health, contai of carbolic acid. Carbolic acid and creasote someti strangury. Carbolic acid and sulpho-carbolates ad by the stomach prevent, as we have shown, decom the urine; possibly these drugs may prove useful agents to preserve the urine sweet in cystitis, enlarged prostate, and paralyzed bladder.

Dr. Lloyd Roberts, of Manchester, was one of the earliest to draw attention to the virtues of carbolic acid, now often employed in ulcer of the os and cervix uteri, in chronic inflammation of the uterus and cervix, with excoriation, and in chronic uterine catarrh. "I use," says Dr. Roberts, "invariably the pure acid. A capital plan for maintaining the fluidity of the acid, devised by Mr. Weir, of Dublin, and recommended by Dr. Roe, is to add a few grains of camphor to a little of the acid. In simple ulceration, a free application of the acid drawn over the surface twice a week is sufficient. When it is necessary to apply the acid to the interior of the cervical canal, I use a charged camel-hair pencil or a gum-elastic catheter, having previously removed, with a piece of lint or injection of water, any impeding mucus. In applying it to the interior of the uterus by injection, it is very important to have the cervical canal freely open, so that any superfluous injection may pass freely out. Care should also be taken to ascertain the direction of the uterus; as in cases of retroflexion any of the injection passing beyond the curved portion of the organ and retained there, would be certain to produce untoward consequences. When injected into the uterine cavity, the acid should be diluted with glycerine and water, commencing with a weak solution, gradually increasing the strength as circumstances require. I also use this acid, freely as an ordinary injection in vaginal leucorrhœa, uterine ulceration, and cancer; and it will be found an excellent cleanser, healer, disinfector, and allayer of pain. Although its action does not penetrate below the diseased surface, it possesses in equal degree with the stronger caustics the property of changing the vitality of the tissues, and produces rapid cicatrization, dissipates the inflammation and hypertrophy, and relieves pain."

An injection composed of twenty grains of sulpho-carbolate of zinc to eight ounces of water, used twice or thrice daily, is useful in gonorrhœa.

It is said that sponging the exposed part of the body with a weak solution of carbolic acid will drive away mosquitoes.

MUSK. CASTOREUM.

These medicines, although once highly esteemed, especially musk, by Graves and Cullen, are but seldom used. Their peculiar and characteristic odour is oppressive and sickening, and sometimes causes headache, giddiness, and even fainting; hence musk is ill adapted for the sick room.

These substances have a bitter taste.

Jorg asserts that musk, in two to five-grain doses, causes weight at the stomach, eructations, dryness of the œsophagus, heaviness of the head, giddiness, headache, followed by sleepiness, faintness, and a sensation of heaviness in the whole body; and in very large doses, trembling of the limbs, and even convulsions. It is said they strengthen and quicken the pulse. Trousseau and Pidoux failed to obtain these symptoms, noticing only headache with giddiness, the pulse being unaffected.

These remedies are employed in melancholia, and for many of those anomalous but distressing symptoms grouped under hysteria. They have been given in chorea, epilepsy, whooping-cough, nervous palpitation, cramps of various parts of the body, and even in tetanus. Dr. Graves employed musk in typhus and other fevers, to prevent prostration, and to strengthen a weak and feeble pulse.

ALCOHOL.

For many reasons alcohol might be grouped conveniently with chloroform and ether, there being much similarity in the action of these three medicines. Each, at first, produces much excitement, with increased strength of the pulse, this stage after a time giving way to another of unconsciousness, which may be profound; but with this general similarity there is an important difference between alcohol on the one hand, and chloroform and ether on the other. With chloroform and ether the stage of excitement is brief, soon passing into that of insensibility, which may endure a long time without danger to life. But with alcohol the early stage of excitement and intoxication is of considerable duration, insensibility and unconsciousness not coming on till large quantities have been taken, and some time has passed. In this stage of insensibility the danger of death is imminent from paralysis of the heart and of the movements of respiration. It will be easily understood, therefore, that while chloroform, and ether are used as anæsthetics, alcohol is inadmissable for this purpose.

Alcohol, owing to its volatility, is sometimes employed to abstract heat, and cool the surface of the body, as in inflammation of the brain, etc., but it is not a very effectual refrigerator, and ice is preferable.

If its evaporation is prevented, it penetrates the skin, owing to its tolerably high diffusion-power, and excites the tissues beneath the cuticle, causing a sensation of heat and some inflammation. It may be thus employed as a counter-irritant.

It coagulates albumen, and is sometimes used to cover sores with a thin, protective, air-excluding layer, which promotes the healing process. Alcohol, in the form of brandy or eau de Cologne, is often applied to harden the skin of parts exposed to pressure, and to obviate the occurrence of bed-sores, an excellent practice which should be adopted before the occurrence of abrasion, or even before redness occurs.

It is a useful practice to bathe the nipple with brandy, each time after a suckling, then carefully to wash the part, and dab it dry. It is well to apply the brandy some days before delivery, so as to harden the tissues, and prevent the formation of cracked nipples, which gives rise to so much pain and distress.

In virtue, probably, of its power to coagulate albumen, and perhaps of other properties, it constringes to a small extent the mucous membrane of the mouth, and is sometimes used, diluted with water, as an astringent gargle in relaxed throat, scurvy, salivation, etc.

In the stomach it exerts a double action. Thus it may affect both the gastric juice and the secreting mucous membrane. Its action in these respects will be considered separately. The effect of a small quantity of alcohol on the pepsine of the gastric juice is insignificant; but a large quantity destroys the pepsine and its food-dissolving property.

As with the gastric juice, so with the mucous membrane, the topical effect of alcohol differs according to whether the dose is large or small. It has been experimentally proved that taken very moderately it increases the secretion of the gastric juice, and every-day experience confirms this fact; whilst undue quantities destroy the appetite, upset the stomach, inflame its mucous coat, cover it with a thick tenacious mucus, and abolish its secreting power.

Owing to this influence on the functions of the stomach, alcohol is a remedial agent, as the following examples will illustrate:

I. Some persons after undergoing considerable fatigue are apt to lose all appetite and digestive power, and on taking food to suffer from an undigested load on the stomach; but a glass of wine or a little brandy and water, taken shortly before food, will restore appetite and digestion.

II. In the convalescence from acute diseases, when digestion and strength may remain a long time depressed, alcoholic stimulants taken just before or at meal-times are often serviceable.

III. Many dwellers in towns, who lead a sedentary life and suffer often from weak digestion, find that only by the help of alcohol in some form can they properly digest their food.

IV. Stimulants are most serviceable in the prostration from acute illness, when, in common with the other functions, digestion is much depressed, at a time when it is most important to support the strength until the disease has done its worst. Strength, no doubt, is best supported by food, yet the weakened stomach can digest but sparingly; but at this critical junction alcohol spurs the flagging digestion, and enables the patient to take and assimilate more food.

Next, the time of giving the alcoholic stimulant is a matter of great importance. It should not be given at hap-hazard, as is too commonly the case, but should be given with the food. To a patient labouring under great prostration, in whom digestion is very feeble, food and stimulants should be given together, in small quantities, frequently repeated; but a stronger patient had better take food at the ordinary meal-times, when from habit, the stomach digests better.

It is necessary to insist on this point, as it is common with both doctors and patients to trust to alcohol alone, forgetting that while it benefits by stimulating the heart, it at the same time effectually aids the digestive process, and thus supports the patient in the best and most natural manner.

It has been mentioned that large quantities of alcohol excite catarrh of the stomach; but it is singular how large a quantity a patient prostrated by fever can take without producing this result. The same fact may be noticed in convalescence from exhausting diseases. Still, care must be exercised, since stimulants if too freely given will sometimes upset the stomach so that the food is vomited, an untoward circumstance greatly adding to the patient's danger.

After a variable time, the prolonged indulgence in alcoholic drinks, seriously damages the stomach by producing chronic catarrh. The mucous membrane, coated with tenacious mucus, excites unhealthy fermentation in the food, while the structure of the membrane itself undergoes considerable alteration through great increase of the connective tissue, which by its contraction obstructs and destroys the secreting follicles and their lining cells. The mucous membrane thus becomes thickened, hardened and uneven; and, owing to obliteration of the orifices of follicles, cysts form in its substance, and these enlarge from the accumulation of cells within them. In consequence of these serious changes, little gastric juice is poured out in response to the demand made by the food, while the unhealthy mucous coating of the stomach, by exciting morbid fermentations, induces the production of much gas, with various acids, as butyric, acetic, etc., whence acidity and heartburn. Morning vomiting of a scanty, sour, bitter, and tenacious fluid is a characteristic symptom of this condition.

Owing to its high diffusion-power, alcohol passes readily into the blood, so that but little can reach far into the intestines. Spirits, especially brandy, are often successfully employed after the removal of the exciting irritant, to control the after stages of acute simple diarrhœa, when the relaxed condition of the mucous membrane allows the liquid parts of the blood to pass into the intestines, producing frequent watery stools.

Even in large quantities alcohol appears neither to promote nor to hinder the conversion of starch into sugar.

Observations on the influence of alcohol on the blood and organs have yielded contradictory results, the most recent and elaborate investigations of Drs. Parkes and Wollowicz clashing in most particulars with those of previous experimenters. Hitherto it was held that alcohol diminishes the oxidation of the body, but Parkes and Wollowicz's observations are opposed to this conclusion. Dr. G. Harley found that alcohol in small quantities added to blood withdrawn from the body lessened its absorption of oxygen and its elimination of carbonic acid.

As the result of a great many observations taken in conjunction with Dr. Rickards, every quarter of an hour for several hours, on persons of all ages, we found that alcohol, brandy, and wine diminish the body temperature. After moderate doses, the fall was slight, amounting to not more than 0·4° to 0·6° Fah., but after poisonous doses the depression in one instance reached nearly three degrees; in rabbits the fall was much greater, reaching to ten or more degrees. These observations have been confirmed by Professor Binz, of Bonn, and by Dr. Richardson, who asserts that all alcohols reduce the animal temperature. Drs. Parkes and Wollowicz, whose observations are opposed to the foregoing, gave to a healthy young man, in divided quantities, for six days, a daily amount of absolute alcohol varying from one to eight ounces, and on a subsequent occasion twelve ounces of brandy daily for three days, observing meanwhile the temperature of the body every two hours. The average temperature of the alcohol and of the brandy-drinking days was found to be almost identical with that on days when only water was taken. These conflicting results it is difficult to reconcile; but it must be granted that a considerable quantity of alcohol repeated several times a day does not permanently reduce the body temperature. Dr. Parkes has recently re-investigated this question, and he finds that dietetic doses (two fluid ounces of absolute alcohol) given to a healthy fasting man at rest, often reduces the rectal temperature rather less than half a degree; but when the alcohol is given with food even in doses of 4 to 8 ounces of absolute alcohol, it produces no effect on the temperature. In a boy aged ten, who had never in his life before taken alcohol in any form I found through a large number of observations a constant and decided reduction of temperature. It is possible that alcohol given in repeated doses may soon lose its power of depressing the temperature. Excessive habitual indulgence appears to have this effect; for Dr. Rickards and I gave to an habitual drunkard, making him "dead drunk," twelve ounces of good brandy in a single dose, without the smallest reduction of the temperature.

In their experiments on the urine Böcker and Hammond found that "the formation of urea of the extractives, and of sulphuric acid and phosphoric acid, was lessened by alcohol and beer, and the water and free acidity of the urine was diminished;" but in Parkes' and Wollowicz's observations, alcohol, brandy, and claret produced no decreased elimination by the urine of urea, phosphoric acid, or free acidity. They however increased the amount of urinary water.

Edward Smith found that brandy and gin diminishes, while rum increases, the pulmonary carbonic acid. These conflicting statements it is impossible to reconcile; but Parkes' observations were so carefully conducted, and are so complete, that they must be accepted as authoritative.

How much alcohol is consumed in the body? The results of investigations to determine this point are so contradictory, that it is impossible to decide the value of alcohol as a food. Bouchardat, Sandras, and Duchek conclude that alcohol is freely consumed in the body, little escaping by the urine, unless very large quantities are taken. On the other hand, Perrin, Duroy, and Lallemand deny that alcohol is consumed in the smallest degree in the body. Anstie concludes from careful experiments that the greater part of the alcohol is consumed, and he has undoubtedly proved that only a little escapes with the urine, while Parkes and Wollowicz believe that a considerable quantity escapes with the sweat and breath. Dupré's recent observations confirm those of Anstie, proving that only a fractional part of alcohol escapes from the body; and Anstie believes that this never occurs except with a narcotic dose, which varies in different persons.

Even if the greater part of alcohol is consumed and thus ministers to the forces peculiar to the body, yet alcohol by depressing functional activity, favouring degeneration, &c., may do more harm than can be counterbalanced by any good it may effect by the force it sets free during its destruction; even if taken in quantities too small to do harm, yet it can scarcely be classed as an economical food for the healthy. Granted that dietetic doses check oxidation in the healthy and thus economize the blood and tissues, still, unless it can be shown that in health there is constantly an excess of consumption over and above that required by the body, such a diminution of oxidation could only result in lessening the amount of force set free and put at the disposal of the organs, entailing of course a diminution of the functional activity of the body. Physiology failing to guide our steps amid these conflicting statements, it is obvious that, in estimating the value of alcohol in health or disease, we must rely solely on experience, which plainly shows that, for the healthy, alcohol is not a necessary nor even a useful article of diet. Varied, repeated, and prolonged experience, and the testimony of army medical men, prove that troops endure fatigue and the extremes of climate better, if alcohol is altogether abstained from. The experience of the celebrated Moscow campaign showed this; so also quite recently the Red-river Expedition. During arduous marches it has always been found that, without alcohol, the health of the men is exceptionally good, but as soon as spirits are allowed, disease breaks out. Modern trainers recognize the fact that the power of sustained exertion and resistance to fatigue is best promoted by abstaining from alcohol, and the ill-health of many athletes depends, not on the rigour of the training, but on the excesses they indulge in after the contest.

There can be no doubt that healthy persons, capable of the fullest amount of mental and physical exertion without the stimulus of alcohol, not only do not require it, but are far better without it.

It must be recollected, however, that these remarks apply to pure alcoholic drinks, as spirits, and not to beers and wines which contain ingredients useful as food. The amount of alcohol in the lighter beers and wines is small, and can hardly be prejudicial to the robust, while they seem to brace up and sustain the flagging functions of the weakly, as town-dwellers, especially those who pass much of their time indoors, in an unhealthy atmosphere. Some indeed cannot properly digest food without a stimulant.

Dr. Anstie speaks highly of alcoholic stimulants in the debility of old age, especially in the "condition of sleeplessness attended often with slow and ineffectual digestion and a tendency to stomach cramps." He employs "a generous and potent wine," containing much ether.

Alcoholic drinks, especially those containing a large quantity of volatile ether often relieve the pain of neuralgia, the alcohol removing the temporary nervous depression which produces the paroxysm; alcohol for a time relieves the distressing symptoms occurring in so-called hysteria, generally met with in middle-aged women; but, as the stimulant after a time must be taken in increasing quantities, there is great danger lest the patient should acquire the habit of taking alcohol to excess. Nervous or neuralgic patients are often prone to imbibe alcohol in excess and thus many women become confirmed tipplers. It behoves, then, the doctor to be very guarded and precise in prescribing alcoholic stimulants.

Whatever doubt may exist concerning the usefulness of alcohol in moderate quantities, there can be no question of its pernicious and poisonous effects when taken in excess. It then injures and degenerates the tissues of all parts of the body and produces premature old age. The lungs become prone to emphysema; there is diminution of both physical and mental vigour; the kidneys, liver, and stomach may become cirrhosed. Even in a state of so-called health when the effects of hard drinking are not very apparent, they become at once evident on the occurrence of illness or accident, when the constitution manifests its undermined condition and its diminished power to resist disease. Thus drunkards succumb to accident or illness which temperate men easily pass through.

Delirium tremens may arise in different ways; sometimes through a single debauch, but commonly it attacks those who habitually take an excessive quantity of wine or spirits, without perhaps ever getting drunk. In an attack arising from an exceptional debauch, it is merely necessary to withhold spirituous drinks for a time, to allow the system to get rid of the alcohol. On the other hand, delirium tremens is often excited in habitual topers by altogether withholding intoxicating drinks, so that in treating these chronic drinkers a moderate quantity of some alcoholic drink for a time must generally be allowed.

The influence of alcohol on the heart is most noteworthy. It strengthens the contractions of the heart, especially when this organ is weakened by debilitating diseases, which are always attended by a quickened and weakened pulse. In health alcohol dilates the arterioles and makes the pulse larger and softer; in disease or when from other causes the arterioles are relaxed, it contracts them, rendering the pulse smaller, slower, less frequent and more resistent; alcohol strengthens the pulse, and reduces its frequency and must be considered one of the most powerful cardiac tonics. This tonic property, combined with its influence in promoting digestion by increasing the gastric juice, explains the great usefulness of alcoholic beverages in debilitating chronic and acute diseases.

In most diseases accompanied by weakness or prostration, alcohol in one or other form often proves a valuable remedy. It is of conspicuous service in acute diseases running a limited and definite course, in the treatment of which the cardinal point is to sustain the vital force beyond the critical stage.

Brandy or wine are the best remedies when the heart is suddenly enfeebled, from fright, loss of blood, accidents, or other causes.*

Great as are the beneficial effects of alcohol in disease, yet it may do harm as well as good. Certain precautions must therefore be observed, and its effects on the functions must be carefully watched. Although the heart affords the most trustworthy information on this point, yet the influence of alcohol on the other organs must not be overlooked, as it may happen that while alcohol may benefit one part of the system it may injure another, doing good in one respect, yet on the whole inflicting more harm.

The following rules regarding the use of stimulants in fever were laid down by Dr. Armstrong, and were endorsed by Dr. Graves.

1. If the tongue become more dry and baked, alcoholic stimulants generally do harm; if it become moist they do good.

2. If the pulse become quicker, they do harm; if it becomes slower, they do good.

3. If the skin become hot and parched, they do harm; if it become more comfortably moist, they do good.

4. If the breathing become more hurried, they do harm; if it become more and more tranquil, they do good.

These excellent rules might be supplemented by a fifth; alcohol does good when it produces sleep, and quells delirium (See Opium).

In judging of the influence of alcohol on the pulse, its compressibility is of more importance than its volume. Under the action of alcohol a soft and yielding pulse of large volume often becomes much smaller and less compressible, changes indicating an increase in the tonicity of the arteries, and in the strength of the heart.

Such are the rules which must guide us in the employment of alcohol in disease, giving us data as to the quantity we should administer, and whether we should continue, increase or withhold it.

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* In threatened fainting, it is a good plan to direct the patient whilst sitting down to lean forward and place the head between the legs as low down as possible so that the blood may gravitate to the brain.

There are other circumstances which we must carefully regard in respect to the employment of alcoholic drinks. At the two extremes of age, the powers of the body being easily depressed, stimulants are accordingly called for early, and must be freely used. In the aged, especially, it is of great importance to anticipate prostration by the early employment of alcohol; for it is very difficult to overcome this condition. Young children prostrate from disease, take stimulants with benefit, even in large quantities. Next, the knowledge of the course a disease ordinarily runs, gives us timely indications in respect of this question. In some acute diseases, as typhus, in which the depression is often very marked, especially at the extremes of life, stimulants should be employed early.

Alcohol has been given lately, to fever patients in very large quantities on the Continent, and to some extent in England. In this country Dr. Anstie is the chief supporter of this treatment. Alcohol is given to reduce fever and to check waste. In fevers, no doubt there is great increased destruction, certainly of the nitrogenous tissues, shown by the large quantity of urea eliminated by the urine, at the same time all the functions of the body are much depressed, and can appropriate less of the force set free by oxidation than in health. From these two causes, and partly likewise from diminution of perspiration, so that the heat fails to pass off duly by the skin, preternatural temperature of the body occurs in fevers. Alcohol in large doses, it is maintained, lessens oxidation and prevents waste, and thereby lowers the temperature of the body and diminishes the amount of urea in the urine; but to effect this, very large doses must be given—doses which, in some cases at least, I should imagine might do harm in other ways; hence, the influence on the pulse, respiration, &c., according to the rules just laid down, must be very carefully watched.

Several years ago, I made a large number of observations concerning the influence of alcohol on the temperature of fever, and found that as in health, so in fevers, alcohol slightly reduces the temperature; but its efficacy in this respect is so insignificant, and doses so enormous must be taken to produce even trifling results, that it is useless to give alcohol solely with this intention.

In my judgment there can be no doubt that alcohol is not required in all febrile diseases; on the contrary, many cases are best treated without it; and in no instance should it be given unless special indications arise. The enormous quantities of alcohol which used to be given a short time ago, and are indeed now sometimes administered, are, I believe, rarely needed, although very large doses are occasionally needed and are undoubtedly the means of saving life.

The kind of alcoholic stimulant employed is perhaps not a matter of great importance, provided its quality is good. It is undesirable to give several kinds of stimulants at about the same time, or they may derange the stomach; but they may be changed from time to time according to the patient's desire. Anstie recommends strong alcoholic drinks in fevers, as brandy in the early and middle stages; but when the heart flags, and the nervous system becomes weakened, he prefers wines containing plenty of compound ethers. Stimulants should not be given in large quantities to weakly persons at distant intervals of the day; it is far better to give them in small and frequent doses. A large dose at one time strongly stimulates the heart; then, as the alcohol is decomposed or eliminated, the heart is left unsustained, when great weakness may set in; whereas the frequent administration of smaller quantities keeps the heart more uniformly supported.

Some easily digested food in small quantities should be given with the stimulant, which, by promoting digestion, supports the patient's strength in the most natural and most effectual way. As a rule, when food is freely taken and digested, stimulants are little needed.

Weakly children derive more benefit by taking stimulants about an hour before rather than with food, which plan enables them to take more food, and to digest it better, than the more common one of giving the stimulant with food.

In common with ether and chloroform, alcohol is an antispasmodic, but in this respect ether and chloroform are more effective.

It does sometimes happen that one alcoholic stimulant is harmful, while another is found useful; a fact especially noticeable in coughs, which are aggravated by porter or beer, but are unaffected or even relieved by brandy or wine. Beer or stout sometimes produces sleepiness, heaviness, even headache, and flushing of the face, while the same person can take wine or brandy without inconvenience. Individual peculiarities abound in respect of wines; for example, one person cannot take sherry without suffering from acidity, while another on taking port is seized with gouty pains.

The wish of the patient for any particular form of stimulant is often a correct indication of its desirability. A free draught of the weaker beers will often gratefully slake the urgent thirst of fever.

Stout is supporting and nourishing to persons brought low by exhausting discharges, and to women weakened by suckling, though in many cases unfortunately it disagrees, producing headache and sleepiness. The good old-fashioned remedy, rum or brandy and milk taken before breakfast, is useful in phthisis and in exhausting diseases. A little rum and milk an hour before rising is a good prop to town-living women, to whom dressing is a great fatigue, who, without appetite for breakfast, suffer from morning lauguor and exhaustion, often lasting till midday, and to convalescents from acute diseases.

The ill effects of alcohol in gonorrhœa are well known. A cure is much more readily effected if the patient will abstain altogether from alcoholic beverages. Even when the cure seems near completion, a single indulgence in spirits, wine, or beer will bring back the scalding and discharge.

CHLOROFORM.

CHLOROFORM, when applied to the surface of the body, speedily volatilizes and cools the skin; but it is seldom used as a refrigerator, being in this respect inferior to other agents.

Owing to its high diffusion-power, chloroform readily penetrates the animal textures. If evaporation is prevented it penetrates the cuticle and excites inflammation, and, thus, becomes a rubefacient.

In quantity insufficient to excite inflammation, chloroform deadens sensation, and acts as a local anæsthetic. It is sometimes applied to relieve pain, and occasionally with good effect, although it often fails, and is inferior for this purpose to many other external applications. It has been used in neuralgias, sometimes effectively, but it generally fails, and even when successful, the relief is ordinarily very temporary, the pain soon returning.

In faceache or toothache, two or three drops, on a small piece of cotton-wool, introduced into the ear, gives occasionally complete and permanent relief; but if too large a quantity is used, it will excite inflammation, even vesication, and give much annoyance. The pain of cancer, when the skin is broken, leaving a painful, irritable sore, is relieved by playing vapour of chloroform on the raw surface, and often the immunity from pain lasts several hours; a like proceeding relieves the pain of cancer of the uterus, of ulceration of the os uteri, of neuralgia of the uterus, and, in a less degree, the annoyance of pruritus pudendi. The vapour must be made to play on the os uteri for some minutes. I think that chloroform vapour might be useful in cancer of the rectum, spasms of the intestines, etc.; recollecting, however, that chloroform is easily absorbed by the large intestine.

According to Sir J. Simpson, a few drops of chloroform whilst evaporating from the palm of the hand held close to a photophobic eye, will enable it to bear the light without pain.

Dr. Churchill lessens the violence of the paroxysms of whooping-cough by the simple plan of directing the nurse to pour about half a drachm of ether or chloroform over her hand, and to hold it before the child's mouth. The child at first dislikes this treatment, but soon appreciating its benefit, will run to the nurse on the first warning of an attack.

An ointment composed of half a drachm of chloroform to an ounce of lard, will often allay the itching of urticaria, lichen and true prurigo, but, like most other ointments, it loses its effects in a short time, hence anti-itching applications require to be changed from time to time.

Dr. Augustus Waller has shown that chloroform promotes to a considerable extent the cutaneous absorption of many substances. The absorption of watery or alcoholic solutions is far less rapid. The chloroformic solutions of aconite, atropia, strychnia, or opium, applied to the skin, speedily destroy an animal with the characteristic toxic symptoms of the alkaloid employed. He ascribes this property of chloroform to its property of passing rapidly through animal textures, carrying with it the dissolved alkaloid. The addition of a certain amount of alcohol to the chloroformic solution does not hinder the absorption of the alkaloid—indeed, it appears to hasten it; for when an equal quantity of alcohol is added to the chloroformic solution, the absorption is more rapid than when simply chloroform is used. This property either alone or mixed with alcohol should be borne in mind in employing alkaloids as external applications.

Chloroform produces in the mouth a sensation of warmth, and, if undiluted, excites inflammation. Being a stimulant to the mucous membrane, it excites a flow of saliva. A few drops on cotton-wool inserted into the hollow of a decayed aching tooth often gives permanent relief, but when the anæsthetic effect has passed away, the pain is sometimes aggravated, the chloroform having irritated the inflamed pulp. It is a good plan to fold over the hollow tooth a piece of linen moistened with chloroform, so that the vapour may remove the pain. Equal parts of chloroform and opium, or of chloroform and creasote, constitutes a useful application in toothache.

Chloroform excites a sensation of warmth in the stomach, but in large doses it induces nausea and vomiting. Drop doses of pure chloroform are beneficial in flatulent distensions of the stomach, sea-sickness, and other vomitings.

Its high diffusion-power enables it to pass rapidly into the blood, little, if any, finding its way into the intestines. The physical and chemical changes produced in the blood by its admixture with chloroform are at present unknown.

When given in medicinal doses, to a healthy person, it produces very little change either in the frequency or strength of the heart's contractions, though when inhaled, judging by the hæmadynamometer, it is said, at the very first, slightly to increase their force. In disease, on the other hand, when the heart beats feebly, especially if due to some sudden and transient cause, chloroform certainly strengthens the heart's contractions, so relieving such symptoms as syncope, etc.; but it is in no way preferable to a glass of brandy and water or wine. It no doubt acts more quickly and evanescently than alcohol, and its cardiac effect certainly declines more speedily than that of alcohol. It is frequently administered to hysterical patients and others suffering from weakness, depression of spirits, nervousness, etc. Like all stimulants, if habitually ingested it soon loses its effect; and this especially happens with chloroform and ether, so that from time to time the dose requires to be increased, and even then soon loses its efficacy.

In diarrhœa, after the removal of the exciting irritant, spirit of chloroform, may be given with much benefit, combined with astringents and opium. It is useful in intestinal or stomach colic from whatever cause arising, and in renal and biliary colic, in hiccup, hysteria, and asthma, both primary and secondary; and from the relief it gives in these affections, it is ranked among antispasmodics. In the treatment of any of the foregoing diseases it is usually combined with opium, and this combination succeeds admirably. No doubt much of the effect is due to the opium, its action, it appears, however, being increased and sustained by the chloroform. Its mode of action is at present unknown. Possibly by restoring the weakened muscular or nervous system to its natural physical condition, it controls inordinate muscular action, and removes pain, thus becoming a true stimulant.

Chloroform, combined with small doses of morphia or opium, given with a drachm of glycerine, honey, sugar and water, or treacle and water, is often conspicuously beneficial in certain coughs. It is useful when the cough is paroxysmal and violent —violent out of proportion to the amount of expectoration; when, indeed, there appears to be much excitability or irritability in the respiratory organs, and when a slight irritation induces a distressing fit of coughing. In such circumstances the chloroform is of more service than the opium, and should be given in a full, while the opium should be given in a very small dose. This combination allays the cough in the fibroid form of phthisis, so frequently paroxysmal, wearing and exhausting. In this form of lung disease there is often such extensive induration, with thickening of the pleura, as to prevent any expansion of the lung, and consequently of the chest walls, so that little or no air enters the consolidated part of the lung, and no expulsive force can be brought to bear on the mucus. Here our attention should be given to check the abundant secretion, to lessen its tenacity, and so facilitate its expulsion.

Cough, very often indeed, arises from a morbid condition of throat; and even when due solely to lung disease, the application of the mixture just recommended to the throat and parts about the glottis is often beneficial, in accordance with a general fact that remedies applied to the orifices communicating with certain organs, as the nipple, rectum and throat will by nervous communication act on the organs themselves. For example, many coughs are allayed much more efficiently if the opium and chloroform mixture is swallowed slowly, and so kept in contact with the fauces as long as possible.

Being highly volatile, much chloroform passes off by the lungs and its odour can be detected in the breath; some, probably for the same reason, escapes by the skin, and some probably by the urine. In its passage from the lungs it is unlikely in any way to influence the mucous membrane of the bronchial tubes, the quantity separated being very small; and even during and after the inhalation of chloroform we do not observe that it modifies in any way the secretion of this membrane. Its influence, if any, on the kidneys and the urine, is at present unknown.

Harley's observations on the action of chloroform on the respiratory function of the blood tend to show that it lessens the oxidation of the blood, and diminishes the evolution of carbonic acid; but to establish this point we think further experiments are needed.

We will now give a succinct and practical account of the administration of chloroform as an anæsthetic. It is needless to dwell upon the signal and beneficent service this agent has in this respect rendered to mankind.

Chloroform at first very often causes a sensation of tingling and heat in the lips and nose, and these parts, if accidentally moistened with it, may become inflamed even to blistering; an accident which can always be prevented with care, particularly if the nose and lips are first smeared with glycerine or cold cream, or some protecting substance.

The early sensations experienced vary much in different persons, being sometimes so agreeable as to tempt to the inhalation of this substance merely for the sake of inducing them; but in the majority the sensations are more or less disagreeable, often intensely so.

At first there is a sensation of warmth at the pit of the stomach, spreading to the extremities, and accompanied by some excitement; then some or all of the following symptoms soon set in. Noises in the ears, lights before the eyes, heavy weight and oppression of the chest, great beating of the heart, throbbing of the large vessels, and a choking sensation. These symptoms betoken no danger, and need excite no apprehension. At the very commencement of the administration some cough is not unfrequently excited, or even a passing spasm of the glottis, sure signs that the vapour is administered in too concentrated a form, and that more air must be mixed with it, by opening the valve in Clover's apparatus, or by removing the lint farther from the nose and mouth.

At this early stage, women, by becoming hysterical, may give some trouble and alarm. They laugh, sob, or cry; their breathing is often extremely irregular and hurried—a condition which frightens the friends, and inexperienced chloroformers; but this state is to be accepted as an indication to continue, not to withhold it; for this condition soon subsides as the patient passes more deeply under the power of the anæsthetic.

The pulse, at first quick, and it may be weak, if not due to the patient's illness, is the effect of nervousness and anxiety; and as soon, therefore, as unconsciousness sets in, the pulse falls in frequency, and gains in force.

A few seconds from the commencement of the administration, all discomfort ceases, the patient becomes quiet, breathes calmly and feels brave. The consciousness is now more or less affected; questions are still heard, but are slowly answered, and not to the purpose. The induction of this medium stage is adequate for confinement, and for the relief of renal colic.

All knowledge of the external world soon becomes lost, and is followed by a period of excitement. Various incoherent ideas occupy the mind; some struggle, attempt to get up, and when restrained often show much irritation. The stage of complete unconsciousness required for capital operations is now fast approaching. Violent tonic contraction of the muscles of the body often occur before complete unconsciousness and perfect muscular relaxation set in. The extremities become rigid; the muscles of the chest are firmly fixed, and the respiration thus becoming impeded, causes, in combination with the general violent muscular contraction, duskiness or lividity of the face. The eyes are injected or prominent, the lips blue, the jugulars stand out like large black cords, the mouth is clenched, and a profuse perspiration breaks out on the body, especially about the face. In a few seconds all these symptoms pass away. They may be accepted as a sure indication of the immediate approach of utter insensibility and complete flaccidity of the muscles, and as a warning that the administration must be conducted with increased caution, or the patient will suddenly pass into a stage of danger, with noisy, stertorous, quick, shallow breathing, and quick, weak pulse. These violent muscular contractions, which greatly distort the face, and frighten the patient's friends, rarely occur in women or children, or in men weakened by exhausting illness; and it is a condition more frequently seen when the chloroform is administered too abundantly, and the patient brought too quickly under its influence.

As these movements cease, the muscles become flaccid, and the stage of perfect insensibility is reached. Reflex action is lost; the conjunctiva can be touched without producing winking. The limbs, when raised and let go, fall heavily. The breathing is calm but a little superficial; the pulse is not much altered, but it may be a little more compressible. The face is moist with perspiration. The pupil is much contracted. This condition may be maintained with due precaution for a considerable time; but if now the chloroform is continued in undiminished quantity the breathing becomes noisy and stertorous; the pupil greatly dilates; the pulse loses its strength; the breathing becomes gradually more and more shallow, and less and less frequent, till both pulse and respiration stop. Even now, artificial respiration will often restore the breathing, bring back the pulse beats at the wrist, and rescue the patient from the jaws of death. On several occasions, whilst administering chloroform, I have witnessed recovery from this critical condition.

On the other hand, it appears that sometimes, without warning, while the pulse is beating well and the breathing is deep and quiet, the heart suddenly stops, and respiration immediately ceases. This form of death arises probably from cardiac syncope, while the other form of death is probably due to gradual paralysis of the respiratory muscles from the effect of the chloroform on the respiratory centres. (See Belladonna).

Chloroform insensibility may with care be maintained for hours and even days.

In administering chloroform, the attention should be directed to the state of the pulse, the breathing, the conjunctiva and the pupil. The pulse usually retains throughout its frequency and force. Should it become quick and weak, or irregular, then the inhalation must be withheld, unless the frequency of the beats can be accounted for by the patient's struggles. The breathing often affords an earlier sign of danger than the state of the pulse. If the respiration become very shallow, and gradually less frequent, the chloroform should be suspended for a time.

The surest signs of safety, and the earliest of danger, are afforded by the state of the conjunctiva and pupil. While irritation of the conjunctiva causes reflex action, and is followed by blinking, there is usually no danger. The pupil is much contracted in the stages of insensibility when no danger is to be apprehended; but on the approach of peril from over-dose of the anæsthetic, the pupil dilates.

It is concluded that chloroform affects the pupil, by first stimulating, and then paralysing the oculi motor nerve centres, for during the contraction of the pupil stimulation of the cervical sympathetic is without effect, but when the pupil begins to dilate this stimulation increases the dilation.

When, on touching the conjunctiva, reflexed action is annulled and the limbs when raised, fall heavily, the patient is fit to undergo any operation.

One or two circumstances require a passing notice. Vomiting is liable to happen if food has been taken a short time before the chloroform, occurring either as the patient is passing under its influence or more commonly on recovery from it, ceasing always when under the full effect of chloroform. Vomiting, happening after complete chloroformization may be taken as a sign of returning consiciousness; and if the operation is uncompleted, the inhalation should at once be continued, when the vomiting will speedily cease. But to avoid vomiting, it is advisable that the patient should take no food for three or four hours before chloroformization. At the same time too long a fast should be avoided, or its very purpose may be defeated by inducing the tendency to vomit; and fainting and much exhaustion may occur from a small loss of blood during the operation. The head should be turned aside to assist the escape of the vomited food, and to prevent choking.

It should be borne in mind that operations on the rectum and vagina, even when the patient is quite insensible, often, nay generally, cause noisy catchy breathing, very much resembling stertorous breathing, often mistaken for it, and sometimes thought to indicate that too much chloroform has been administered; but this is not the case. The true state of things can generally be discriminated by a little attention to the circumstances. Thus, the noisy breathing does not occur until the rectum and vagina are manipulated, and is especially loud and noisy when the finger or an instrument is passed with any force into either orifice.

On discontinuing the administration, consciousness usually returns in a few minutes, but is sometimes delayed for a longer period. If perfect quiet is observed, its effects are often followed by sleep, which refreshes the patient, gives time for many of the disagreeable consequences of the inhalation to pass off, and allows the pain of the operation to subside.

Experiment, practice, and common sense show that the danger of chloroform is in proportion to the percentage of vapour inhaled in the air. The importance of ascertaining the minimum quantity sufficient to bring the patient speedily and safely to a state of insensibility is apparent. Mr. Clover has shown this to be in the proportion of 4 to 5 per cent. of chloroform vapour. With this percentage, insensibility can be produced in about five minutes, with the minimum of danger. In animals killed by the inhalation of this proportion of chloroform, the heart will continue to beat long after respiration had stopped. At the beginning, Mr. Clover administers about 2 per cent. vapour, and as the patient becomes accustomed to its action the quantity is increased till 5 per cent. is reached.

The way chloroform destroys life is not yet well worked out, and much uncertainty still remains concerning its action on the heart. The sequence of events in animals killed by chloroform, when the percentage of its vapour is not sufficiently great to destroy life at once, is as follows:—The breathing grows gradually more and more shallow and infrequent, while the pulse becomes weaker and even ceases; soon after, breathing stops; but still, for a short time, the heart continues to beat languidly. This is the order of the toxic phenomena in animals, and that most frequently met with in the human subject. Here it is difficult to say whether the poison acts directly on the heart, and whether the enfeeblement of the heart-beats and the cessation of the pulse is due to the direct attack upon the heart, or whether it is simply connected, and depends on the gradual cessation of the breathing. It seems probable that the heart may be directly poisoned and paralysed by chloroform; for the heart's movements cease immediately when a very large percentage of the vapour is breathed; and further, Dr. Harley has shown that a frog's heart suspended in chloroform vapour, ceases to beat much sooner than one suspended in watery vapour.

The direct action of chloroform on the heart is probably displayed in those cases in the human subject, when, without warning, the patient becomes pulseless, breathless, and dies.

When any serious symptoms arise, and danger is apprehended, the chloroform administration should, of course, be discontinued, and artificial respiration, after Sylvester's method, practised instantly and assiduously, whether the breathing has ceased or is growing slower and shallower. Where the breathing has been extinguished in a gradual manner, the patient, provided artificial respiration is instantly adopted, in a few seconds, in most instances, fetches a deep gasp, which is soon repeated, and presently the breathing grows more freqrent, till it becomes natural, and he is saved. When the chest has ceased to move, the pulse to beat, and when the patient presents all the appearances of death, even at this crisis life may generally be restored. Little is to be hoped, however, from artificial respiration in those cases where the breathing and pulse both cease immediately, without any warning. Besides the use of artificial respiration, cold water should be dashed over the face and chest, air should be freely admitted, and all hindrance to breathing removed; indeed, everything hampering to the breathing, as stays or a tight dress, should be removed before the administration of chloroform. The most serious impediment to the breathing, sufficient to endanger life, may be caused by the patient lying prone for the convenience of the operator. Several times I have witnessed cases of imminent danger from this cause. When this position must be assumed, the most anxious care must be paid to the state of the breathing; for this prone posture is itself quite adequate to arrest feeble breathing, which without this impediment would go on safely.

It is a question of importance whether galvanism should be used in danger from chloroform. The committee appointed by the Medical and Chirurgical Society are of opinion that this agent is useful, but that it is far inferior to artificial respiration; but some authorities are wholly opposed to its use, on the score of its influence to arrest a very feebly acting heart and so diminishing any slight remaining hope of recovery. It is advised to apply it to the phrenic nerve, to stimulate the diaphragm to action, and thus maintain breathing till the chloroform shall have had time to evaporate from the blood, and the system become free from the drug. But artificial respiration is a more potent agent to excite the respiratory functions.

It has been proved that a certain percentage of chloroform, amply sufficient to produce, speedily, complete unconsciousness, can be inhaled with safety for an almost indefinite time. It is therefore obvious that the method required should enable us to give this percentage with certainty, throughout the most protracted operation, so that the proportion compatible with safety shall never be exceeded. The contrivance which best fulfils this condition is the ingenious apparatus of Mr. Clover. Its advantages are so great as to outbalance fully the slight inconvenience connected with its use. If this apparatus is not at hand we may adopt the use of a simple piece of lint and a towel, or Dr. Simpson's method, or Skinner's cone.

Are there any conditions of age or health which forbid the use of chloroform as an anæsthetic? Provided due care is observed, I think it may be given to all persons, irrespective of their condition, having myself given it without any threatening symptoms, in serious heart disease, in every stage of phthisis, in Bright's disease, cancer, chronic bronchitis, to patients almost dead of exhaustion from loss of blood, to children of a few weeks, and to persons close upon a hundred years old. No doubt a dilated or a fatty heart adds to the patient's risk, and enforces on the operator more care and anxiety, and the two extremes of age are conditions which exact close watching whilst giving chloroform.

For minor operations ether spray is undoubtedly to be preferred to the inhalation of chloroform; but for the more formidable operations chloroform should be used. In addition to its more obvious and inestimable advantages in operations, chloroform ha been found to reduce the mortality.

Chloroform inhalation is now frequently used with much advantage during delivery; it eases the uterine pains, without increasing the danger to mother or child. It is not necessary to obtain complete unconsciousness, but to give only sufficient chloroform to dull the pains; if this recommendation is disregarded, and the anæsthetic is pushed to the stage of complete unconsciousness, it weakens the contractions of the womb, and retards delivery. It is true that even if only slight unconsciousness is produced, the uterine contractions are probably somewha weakened, but accoucheurs maintain that this disadvantage is more than compensated by the relaxation of the parts, and the abatement of spasm. Dr. Playfair who thinks chloroform inhalation is too indiscriminately used, says, he has often observed the pains alter and become less effectual after chloroformization, and when it is prolonged he thinks it favours *post-partum* hæmorrhage, (see Chloral).

In dental operations the patient incurs some additional risk of syncope, owing to his sitting posture. Chloroform should be avoided in dentistry; indeed, it is now superseded by nitrous oxide.

Chloroform may be used with signal benefit in renal and biliary colic. In my experience it is inferior only to morphia injection, and is very far superior to opium, warm baths, and the ordinary treatment in vogue. It removes the severe pain before unconsciousness is reached; indeed, it is never necessary to carry the administration of chloroform very far. The pain often speedily returns, but may be quelled again; and after two, or at most three administrations, it is often permanently removed.

Chloroform in the treatment of chorea is sometimes very valuable. It is applicable especially to those serious cases in which violent and constant movements prevent sleep, and even the swallowing of food, so that speedy exhaustion and death are to be apprehended. Chloroform in such cases often induces refreshing sleep; indeed, the sufferer passes from the insensibility of chloroform into that of natural sleep, and after, perhaps, some hours, wakes up soothed, refreshed, and with a marked abatement in the movements. So great sometimes is this improvement, that patients, who before the chloroform could scarcely be restrained in bed, after waking, sit up troubled with only slight involuntary movement, and eat and swallow with ease. Soon, however, the movements return, when the inhalation must be repeated. At first it should be administered three times a day; then proportioned to the improvement, twice, and after a time once a day. This treatment it is stated will cure the disease on an average in twenty-eight days. (See Chloral). In delirium tremens, when the usual means fail to induce sleep it has been advised to produce unconsciousness by chloroform inhalation.

Chloroform will arrest convulsive fits, especially in children, sometimes permanently. Chloroform inhalation is of great service in puerperal convulsions. It is necessary in some cases to maintain unconsciousness for hours, or even days, allowing the patient to wake every three or four hours to take food.

In the reduction of hernia its use is obvious. It may be used to assist the diagnosis of abdominal tumours, when deep-seated, and when the walls of the belly are hard and rigid. It is useful also in determining the nature of phantom tumours, which disappear entirely when the patient is made insensible by chloroform.

Chloroform inhalation gives relief in neuralgia, sciatica, colic of the intestines, if the pain is very severe, in distressing dyspnœa, whether this is due to asthma, aneurisms, &c. Mr. Gascoin reports a case of bronchitic asthma much benefited by rubbing the chest for an hour daily with liniment of chloroform. He attributes the success to the friction, and refers to a Widow Pau who has obtained a reputation in Paris by using friction in cases of asthma. The inhalation of a few whiffs in asthma without producing unconsciousness sometimes affords relief: and should the paroxysm return, on the effect of the chloroform passing away, the inhalation may be repeated. A small quantity of chloroform given in this way often suffices to avert an attack, though in most cases the effects are only transient, the paroxysm returning as the influence of the drug wears off.

Insomnia, tremulousness, and inability to fix the attention, are it is said apt to follow the repeated use of chloroform inhalation.

ETHER.

The physiological action and therapeutic use of ether and chloroform are for the most part identical.

As a local anæsthetic in neuralgia, toothache, etc., ether is less frequently used than chloroform.

In the form of spray, after the method introduced by Dr. Richardson, ether is employed temporarily to abolish sensation of the skin; the rapid evaporation of the ether and consequent abstraction of heat, freeze the tissues and annul sensation.

Ether spray is frequently used in minor operations, as the opening of abscesses, the removal of small tumours, etc. It has been successfully employed in amputation of the leg and in ovariotomy, but it is not generally available in operations so serious and prolonged. The skin or mucous membrane, when sufficiently frozen to permit of a painless operation, becomes pale, shrunken, tallowy-looking, and feels as if oppressed with a great weight. Whilst recovering the natural condition, the frozen tissues tingle and smart, sometimes so intensely as to exceed the pain of the operation. The obvious advantage of ether spray over chloroform inhalation is its perfect safety.

The experiments of Flourens and Longet render it probable that ether affects first the cerebrum, next the sensory, then the motor tract of the cord, next the sensory and lastly the motor centres of the medulla oblongata.

Ether for many years preceded chloroform as a general anæsthetic. At the present time there is in this country much contention as to the relative merits of chloroform and of ether; and ether bids fair rapidly to take the place of chloroform. Each has its respective advantages. Ether differs from chloroform in several particulars. Ether must be inhaled in larger quantities, and for a longer time; its effects pass off sooner, consciousness often returning almost immediately the inhalation is suspended; and it produces much more excitement than chloroform. The Committee of the Medical and Chirurgical Society instituted to investigate the action of chloroform and ether, state that at first both strengthen the heart's contractions; soon, however, the heart grows weaker and weaker as the animal passes more deeply under the influence of chloroform; while the tonic effects of ether persist, and the heart's pulsations often continue strong till the moment of death, which in almost every instance depends on paralysis of the muscles of respiration. Thus ether and chloroform both destroy life by arresting respiration; but in regard to chloroform there is an additional danger from its depressing action on the heart.

In America ether is almost universally used in preference to chloroform. Mr. C. Tomes writing from America to the *British Medical Journal*, says, ether is there considered so safe that the pulse is rarely watched, and the patients when fully under the influence are put in any position without fear of danger. The ether is very freely used, sometimes half a pound is consumed for a single operation. He says "two or three ounces of pure anhydrous ether are poured upon a conical sponge previously moistened with water, and this is placed over the patient's mouth and nose. Ether is lavishly poured upon the sponge so that it often runs down the patient's face and neck. Sometimes it excites a good deal of spasm of the expiratory muscles, stridulous breathing and laryngeal spasm, and sometimes a degree of asphyxia far transcending that which I have seen during the administration of nitrous oxide, but no anxiety is felt, the sponge is merely removed for half a minute. It is not a pleasant anæsthetic, patients are apt to be noisy on recovery: vomiting during and after the administration is common." Equally strong testimony regarding the greater safety of ether is given by numerous authorities in this country; and in fact ether seems to be gradually superseding chloroform. As ether is highly inflammable Mr. Hutchinson cautions against using it by gas or candle light or when employing the actual cautery.

Full doses of ether or spirits of chloroform often act as soporifics and are very useful in angina pectoris, sometimes giving even more prompt and permanent relief than nitrite of amyl.

Freezing the skin with ether spray sometimes removes sciatica or neuralgia permanently, but the relief generally is but temporary.

In an interesting lecture on anæsthetics, Dr. Richardson discussed the merits of the following substances, differing only in the amount of chlorine they contain.

C H H H Cl	Chloride of methyl.
C H H Cl Cl	Bichloride of methyline.
C H Cl Cl Cl	Chloroform.
C Cl Cl Cl Cl	Tetrachloride of carbon.

"All these substances," he says, "possess the power of producing anæsthesia when they are inhaled as vapour by men and animals."

"Chloride of methyl exists in all ordinary temperatures as a permanent gas. It is very soluble in ether; and when ether is saturated with it, the compound is one of the most perfect of anæsthetics. Unfortunately this compound is not very stable, the sleep produced by it is rapid, gentle, profound and prolonged, and I found in an animal, where I may say I forced the animal to die by increasing the quantity of the vapour, that the muscular irritability was perfect one hour and five minutes after death." It is soluble in water, and water charged with it will take up four volumes. Chlormethyl water is rather agreeable to drink, and is a potent intoxicator. Half an ounce has a very decided but transient effect.

"Bichloride of methyline is a colourless fluid, having an odour much like the odour of chloroform. It is pleasant to inhale as vapour, and produces very little irritation of the fauces and air-passages. Its specific gravity is 1·344. From its position physically it combines many of the properties of chloroform with those of ether, and these peculiarities must be remembered in its administration. From its easier evaporation it requires more free administration than chloroform, and from its greater density of vapour it requires less in quantity than ether." The bichloride of methyline sometimes excites vomiting. Dr. Richardson, to whom we are indebted for the introduction of this anæsthetic, thinks it less dangerous than chloroform. In an interesting letter to *The Lancet*, Mr. T. C. Morgan says that bichloride of methyline has many advantages over chloroform; for, 1st, it is safer; 2nd, its action is more rapid, complete unconsciousness being usually induced in two minutes; 3rd, recovery is more prompt, the patient regaining complete consciousness in one to three minutes; 4th, dangerous symptoms subside sooner, lividity disappearing in a few seconds on discontinuing the inhalation; 5th, if during the operation consciousness returns, it may be abolished by a few inspirations. Mr. Morgan thinks it excites vomiting about as often as chloroform. He has administered it over 1800 times to persons of all ages and has sometimes continued the inhalation for three quarters of an hour, but never lost a patient. He employs "a perforated card-board frame, covered with flannel and fitted with lappets to lie over the face so as to completely exclude air. Two drachms are put into the inhaler, and it is so closely held before the face as to allow no air to be breathed except what passes through the flannel. In less than two minutes the patient is usually completely insensible. Another drachm is then put into the inhaler, and given as required." He does not care to watch the pulse though this is sometimes much retarded, sometimes beating only twelve strokes per minute without any alarming symptoms. He watches the lips and breathing, when the lips become white and bloodless he stops the administration, fearing pallor, not lividity, for patients die from syncope, not coma.

Mr. F. Searle's testimony is similar, but he states that it rarely excites vomiting, and that it is important not to allow the patient to recover before the administration is completed, otherwise excitement ensues. Mr. Miall and Mr. Gaine also speak highly of this anæsthetic.

IODOFORM.

Iodoform is a healing and soothing application to spreading and sloughing sores, as bed-sores and soft chancres. The sore dusted over with iodoform is covered with some bland application, as glycerine spread on lint. It has been successfully employed in ulceration of the nose and throat. It relieves the pain of cancerous sores. When employed in uterine cancer, a bolus containing from eight to sixteen grains made up with cocoa-nut fat is inserted into an excavation produced by sloughing or ulceration. An iodoform suppository is also useful in painful diseases of the rectum and bladder.

Dr. Tanturri recommends an iodoform ointment of ʒ j to ℥ i for prurigo.

Iodoform is said to relieve the pain of neuralgia and gout. A saturated solution of iodoform in chloroform is advised in neuralgia.

Iodoform must not be applied to inflamed tissues, or it will increase the inflammation.

Given internally, it produces a kind of intoxication, followed by convulsions, with tetanic spasms, and the breath and tissues of the animal give out the odour of iodoform.

HYDRATE OF CHLORAL.

We owe most of our knowledge of this valuable medicine to Liebreich.

Chlorine acting on alcohol ($C^2 H^6 O$) first produces aldehyde ($C^2 H^4 O$), and afterwards chloral ($C^2 H Cl^3 O$), which forms a crystalline soluble hydrate. The addition of an alkali to a solution of hydrate of chloral, gives rise to the formation of chloroform and formic acid.

This decomposition led Liebreich to believe that the alkali of the blood decomposes hydrate of chloral, forming chloroform, and that the properties of chloral are due to the chloroform slowly formed in the blood. In support of this view several observers have obtained chloroform, by distillation of the blood of animals poisoned by chloral; but probably the chloroform is given off by the heat necessary for the distillation, as Hammarsten found that on adding chloral to blood, and passing carbonic acid through the mixture, he failed to obtain chloroform, but on subjecting the mixture to distillation chloroform was readily given off.

Dr. Amory also concludes from his experiments that chloral hydrate does not decompose in the blood, and that its effects are consequently not due to chloroform. He could not detect chloroform in the blood, excreta, breath, &c., of animals poisoned with chloral; whilst in animals poisoned with chloroform this substance was easily detected in both the blood and excreta. These statements are confirmed by other observers. This evidence is rendered conclusive by the experiment of Rajewsky and Lewisson, who, after washing out from the vessels of a frog all the blood, and substituting a neutral solution of common salt, and then administering chloral, its characteristic effects were produced.

In moderate doses chloral causes sleep, sometimes makes the pulse a little slower, and contracts the pupil. Large doses induce profound sleep, passing into coma. The pulse is either slow or very weak and quick, the temperature falls. The pupil contracts at first, and then dilates. There is great muscular relaxation, diminished or abolished reflex action, and sensibility, and the animal dies by arrest of respiration or paralysis of the heart.

The most characteristic effect of chloral is sleep, in part due probably to its direct action on the nervous structure of the brain, but in part also to the anæmia it produces in this organ. Thus Dr. W. H. Hammond finds that at first chloral congests the retina, but in five or ten minutes the opposite condition commences, and continues till the retina assumes a pale pink colour. As the retinal circulation corresponds with the cerebral, he concludes that chloral affects the brain in the same way as the retina, and has proved the correctness of this inference by means of an instrument called the cephalohæmometer, invented independently by himself and by Dr. Weir Mitchel. Dr. Hammond says, that while the brain is congested there is some mental excitement; but as the vessels contract, drowsiness supervenes; and on this wearing off, the retinal and cerebral vessels enlarge till they assume their accustomed size.

Dr. J. H. Arbuckle (*West Riding Lunatic Asylum Reports*, Vol. v.) finds that the following substances—Nicotia, Atropia, Hyoscyamia, Aconitia, Hydrate of Chloral, Nitrite of Amyl, Prussic acid, Strychnia, Morphia, Picrotoxine, pushed even to a fatal dose do not in any degree affect the circulation at the fundus of the eye. His observations were made on rabbits and the results they obtained were, with respect to some of these agents, confirmed by experiments on man; hence, the statement hitherto generally received, that the retinal circulation corresponds with the cerebral circulation, changes in the one always implying change in the other, must be accepted with caution, unless indeed, some of these drugs act on the brain in a manner opposed to the accepted theory and do not influence it by affecting its blood supply.

In his lectures on vascular depressants Dr. Fothergill ascribes this anæmia of the brain to the effect of chloral on the general vascular system. He refers to Ludwig's and Schiff's experiments showing that in health the arterial system is constantly in a state of semi-contraction, and that by relaxation of the vessels the capacity of the vascular system may be doubled.

Dr. Fothergill points out that chloral dilates the arterioles especially of the skin; hence blood is withdrawn from other organs, including the brain, which thus becomes comparatively anæmic.

Liebreich, Tay, Hammond, and others find that a full dose of 40 to 80 grains of chloral depresses the temperature sometimes to the extent of three or four degrees.

Dr. Levenstein reports the extraordinary case of a man aged 35 who was poisoned by six drachms of hydrate of chloral. When first seen he lay in a profound sleep with congested face, heavy breathing, and pulse of 100. An hour after the poisoning he became livid, the veins were distended, the respirations were intermittent, and his temperature was 103° Fah. An hour and half after the dose he became pale, pulseless, with contracted pupils, and his temperature had sunk to 91·2. Nitrate of strychnia enough to produce twitching was then injected hypodermically and the heart at once began again to beat, and the thermometer marked 91·9° Fah., collapse, however, returned in a few minutes, the circulation appearing to stop. Artificial respiration was performed and nitrate of strychnia again injected again with the same result. In ten hours the pupils acted to light; in twelve the temperature was 100·4; in twenty-two hours he could be roused, and after thirty-two hours he awoke "quite refreshed" and did not complain of any gastric disturbance. Dr. Fothergill in his important lectures *on the Depressants of the Circulation* says that Dr. Lauder Brunton finds that after large doses of chloral the temperature falls till it can no longer be measured by an ordinary clinical thermometer. Having determined what dose would kill an animal when exposed to the air, he gave this quantity to two similar animals, wrapping one in cotton wool. The one wrapped up survived, the other died. Then he found out the fatal dose to an animal wrapped up in cotton wool, and gave that quantity to two similar animals wrapping up one in wool and putting the other in a warm chamber; and he found that the one in wool died, the other recovered. A still larger dose was fatal to the animal in the warm chamber. These experiments show that the loss of heat is one, but not the sole, cause of death.

Many observers maintain that chloral produces hyperæsthesia but others contradict this statement. Very large doses produce anæsthesia.

The paralysis and loss of reflex irritability, as the muscles and motor nerves unaffected, is probably due to the effect of chloral on the spinal cord; moreover, direct irritation of the spinal cord produces less active contraction in a chloralized animal than in one undosed with this drug. Some investigators conclude that this paralysis is preceded by heightened activity of the cord.

Some say that at first chloral heightens blood pressure; but all observers agree that large doses lessen this pressure, chiefly by the action of the chloral on the heart, but in part by paralysing the vaso-motor nerves.

Chloral weakens the heart, and after large doses it is arrested in the diastole.

Chloral diminishes the frequency of the breathing, and as this phenomenon takes place after section of the pneumogastric, it is concluded that the drug acts on the respiratory centres.

Hydrate of chloral is chiefly employed to produce sleep or allay pain. Chloral sleep is generally calm, refreshing, and dreamless, not too profound to prevent waking to cough, take food, etc. As a general rule, chloral causes no giddiness, headache, nervous depression, constipation, sickness, or loss of appetite. A patient roused from chloral sleep will eat a hearty meal, then lie down and immediately fall asleep again.

Chloral at first sometimes causes a good deal of heaviness and sleepiness on the following day, but this effect soon wears off. It occasionally produces frightful dreams, and sometimes much excitement, intoxication, and even delirium without sleep.

Sleep comes on sometimes in a few minutes, but more commonly in half an hour, after a dose of chloral. Like other soporifics it should be given shortly before bed-time, and the patient should avoid excitement, and keep quite quiet, else it will produce restlessness instead of sleep. It has been given for many months apparently without any bad results. Its effects sometimes wear off, but in a far less degree than is the case with opium.

Chloral has been found useful in a variety of circumstances. It subdues the sleeplessness of old people, and the wakefulness induced by excessive mental fatigue, succeeding where opium, bromide of potassium, and other remedies fail. In delirium tremens it produces sleep, and calms delirium; but is especially successful when administered at the onset of the symptoms, often averting a serious illness. Large doses have been given, even sixty grains or more, repeated several times. Dr. Da Costa cautions against its administration to patients with a weak heart. He advises its combination with opium. In paralysis of the insane, full doses induce sleep at night, and a moderate dose calms excitement by day. Dr. Macleod has given it daily to the same patient, without bad effects, for upwards of three months, and avers that it is superior to digitalis or the hypodermic injection of morphia. Luke, Clouston, Gardiner Hill, G. Crawford, recommend it in acute mania.

It is employed in puerperal mania and in puerperal convulsions, (Hay, Adams, Teller). It is conveniently administired to the insane in porter.

Dr. James B. Russell, of Glasgow, recommends it in typhus, to produce sleep and allay excitement, especially in violent boisterous delirium. He much prefers it to opium, as the patient can be roused to take food, and readily wakes to clear the bronchial tubes, hence there is much less danger of congestion of the lungs.

Dr. Hughes Bennett used it in phthisis, stating that it produces sleep, allays cough, and sometimes checks sweating, without producing any of the harmful effects of opium.

Chloral sometimes restrains the voluntary movements of chorea, but in many cases it is powerless. It is most useful in those cases where the violent movements render sleep impracticable, the want of sleep in its turn aggravating the choreic movements, till even deglutition may become almost impossible. In these urgent cases ordinary remedies like arsenic are useless, and recourse must be had to narcotics. Large doses of chloral, frequently repeated, will often produce profound refreshing sleep, from which the patient wakes calmed and less convulsed. (*Vide* Chloroform).

E. Lambert recommends chloral in parturition in fifteen grain doses every quarter of an hour till the patient falls asleep; stating that this treatment does not weaken the uterine contractions, while it prevents pain, and insures calm repose after delivery. Dr. Playfair thinks that chloral acts far better than chloroform inhalation, as chloral does not lessen the strength of the contraction whilst it greatly lessens the suffering. Moreover, it is chiefly applicable at a period when chloroform "cannot be used, that is towards the termination of the first stage, before the complete dilatation of the os." The patient falls into a drowsy state—a sort of semi-sleep. Dr. Playfair gives fifteen grains, and repeats the dose in about twenty minutes, leaving its subsequent administration to circumstances.

Chloral is often useful in the convulsions of children. Given in a dose sufficient to induce sound sleep of some hours, the convulsions cease, and often do not recur when the child wakes. If the child cannot swallow, five grains given by the rectum soon induces a deep sleep, and the convulsions then cease, at least temporarily.

Five grains of chloral given twice or thrice daily will often remove a common condition characterized by restlessness, irritability, and nervousness—a condition of ceaseless misery.

Dr. Bradbury and Dr. Thompson speak very highly of the efficacy of chloral in nocturnal incontinence of children.

Liebreich recommends chloral in sea-sickness.

The shortness of breath affecting the emphysematous on catching cold often yields to chloral. When the dyspnœa occurs at night, a full dose (twenty-five to thirty grains) at bedtime calms the breathing, and gives sound refreshing sleep. When the difficulty of breathing is continuous, small doses (two to six grains) should be given several times daily.

It is necessary to give chloral with caution to patients with emphysema and bronchitis accompanied with obstructed circulation, causing lividity and dropsy; for an ordinary dose, besides drowsiness, may produce muttering delirium and a notable increase in the lividity; these effects often lasting several days, and attributable possibly to the slow destruction of the drug in the blood, seem not due to any peculiarity on the part of the patient, as I have seen chloral produce these symptoms in a patient who had previously taken the medicine with benefit.

A full dose of chloral is often useful in a paroxysm of asthma.

Some cases of tetanus have apparently yielded to chloral in large doses; and in some instances this drug has prolonged life and eased pain.

The statements concerning the influence of chloral on pain are conflicting, some asserting that it produces anæsthesia, while Demarquay states that in many instances it excites hyperæsthesia. Chloral it is said simply makes a patient oblivious of pain; but if the pain is too urgent to permit of sleep, chloral fails to give relief. This metaphysical explanation is certainly incorrect; the truth being that for some unexplained reason, chloral in certain cases subdues pain, while in other apparently similar instances it fails. Chloral sometimes relieves the pain of neuralgia, chronic rheumatism, gall stones, colic, and gastralgia. In doses of ten grains, three times a day, it has relieved most severe pain of cancer, without inducing drowsiness. Injected hypodermically, it is liable like chloroform to excite inflammation, and to produce an abscess followed by a scar.

The addition of a small quantity of morphia intensifies considerably the narcotic effects of chloral.

When equal parts of chloral and powdered camphor are rubbed together, they form a syrupy liquid, which, painted on the painful part or gently rubbed in, often affords relief in neuralgia. My friend, Dr. George Bird, has used this compound in several cases of neuralgia and pleurodynia with great success. I have known it cure, promptly, neuralgia of the inferior dental branch of the fifth and neuralgia in the temporal region. It is said often to relieve toothache even when applied externally and I have known it succeed when put into the cavity of the carious aching tooth, but like other applications it often fails in neuralgia without apparent cause, in cases very similar to others it has benefited. When it does answer this liniment generally affords almost instantaneous relief. I have known it give relief in severe pleurodynia.

Although no doubt in some cases, chloral can be borne nightly, for months or even years without producing any ill consequences, yet, recently some doctors have met with patients, who through an injudicious and too continuous use of this drug, have induced symptoms of depression, nervousness, irritability, sleeplessness and even slight paralysis, which soon disappeared on ceasing to take chloral.

Chloral is the antidote of strychnia, physostigma, and picrotoxine; that is to say, if the known minimum fatal dose, or rather, more than fatal dose of one these substances is given, chloral will either prevent death or greatly modify the symptoms induced by any of these poisons. (See Strychnia and Calabar-bean).

Valuable though chloral undoubtedly is, yet it has scarcely sustained its early reputation. It is not so certain a hypnotic as the first overdrawn accounts of its virtues led us to believe, for not unfrequently it produces great excitement, even intoxication, without inducing sleep. Sometimes we meet with a patient who has hitherto taken chloral with good effect, yet, on the occurrence of an acute illness, not only has this drug failed to induce sleep, but, on the other hand, has induced restlessness, and even delirium, with a parched dry skin. Yet with all its shortcomings it is a most valuable remedy.

Liebreich asserts that strychnia is an antidote to chloral.

HYDRATE OF CROTON-CHLORAL.

We are also indebted to Dr. Oscar Liebreich for introducing this valuable agent into the service of medicine. This distinguished experimenter finds that in animals it produces anæsthesia of the head without loss of sensibility of the rest of the body; and in man, anæsthesia of the fifth nerve only. In large doses it produces sleep, and in fatal doses it destroys by paralysing the medulla oblongata. He recommends it in trigeminal neuralgia, but speaks of it as only affording temporary relief; he however greatly underrates its efficacy.

Croton-chloral is perhaps the most efficacious remedy in facial neuralgia. In neuralgia due to carious teeth; in facial neuralgia in old people, in whom the disease is generally most obstinate and severe, it is alike beneficial. In the few cases of that severe form called epileptiform tic, I have had the opportunity of using it, it has proved useless even in large doses. I have found it very serviceable in neuralgia of the back of the head, and also of that of the neck with pain radiating to the shoulders. There is but little evidence at present of its effects on neuralgia of the other parts of the body; Dr. Louis Lewis has by its means promptly cured several severe cases of dysmenorrheal neuralgia. Hitherto, I have not found it successful in neuralgia of the trunk and extremities; but at present my experience of it in this respect is but limited.

I have found hydrate of croton-chloral very useful in migraine.

It is hardly necessary to observe that under the term migraine I include those affections commonly called sick headache, bilious headache, nervous sick headache, and hemicrania. The most characteristic and commonest symptoms of megrim are headache and sickness; but, in a typical case, these symptoms are preceded by other significant and interesting phenomena. At the onset of an attack, a peculiar affection of the sight first occurs, soon to be followed by perversion of the sense of touch and of the muscular sense in the arms and legs, by disordered speech and defective ideation; the headache then comes on, and, as it becomes intensified, nausea gradually sets in.

The affection of the sight may consist of mere absence of vision, beginning at the centre or circumference of the visual field. When at the circumference, the defect is generally situate to the right or left of the axis of vision. From the centre of the visual field, the blind spot gradually expands, and as it enlarges it then clears up in the centre, and so gradually disappears to the circumference. As the blind spot expands, its margin is often lighted up with spectra variously described as glimmering, dazzling, bright zig-zag lines, corruscations, etc.

In ten minutes to half an hour, numbness and loss of sensibility occur on one or both sides of the body, followed by tingling formication, "pins and needles," felt most distinctly in the hands, tongue, and lips. Speech is commonly disordered, the aberration in some cases being simply memorial, in others simply motorial; in others, again, these two derangements of speech are more or less combined. In other words, one patient forgets his words, another forgets how to utter them, whilst a third manifests a combination of these two defects. There is, too, loss of memory, confusion of ideas, and a bewildering feeling, as if the patient were going out of his mind. In half an hour or a little longer, these phenomena are followed by headache, which is generally felt on waking in the morning; is at first slight, but intensifies till it may become most severe, indeed, almost unbearable. It effects one or both brows, and, beginning at one spot, gradually extends, till it may involve the greater part of the head. The throbbing, stabbing, cutting, boring pain is increased by movement, noise, light, smells, or food. When the area of pain is limited, the complaint is termed clavus. As the pain subsides, or even during the whole attack, the patient may suffer dull or shooting pains in the eye of the affected side. There is much tenderness of the scalp during and after an attack.

Throughout the attack, the patient complains of nausea, which may be slight, but usually increases, and, when the pain is at its worst, ends in vomiting, which may be severe and prolonged, causing much prostration; yet occasionally vomiting affords relief.

Lasting a few hours, the whole day, or even two or three days, the attack generally ends in calm refreshing sleep, but sometimes it gradually subsides or ends abruptly in vomiting, perspiration, or, more rarely, a copious flow of tears. The attack may be preceded and followed by very obstinate constipation or by diarrhœa, the liquid motions being in some instances pale, in others of a deep brown mahogany colour. Before and after the attack, there is often much dusky discolouration around the eyes.

It is now almost universally held that megrim is an affection of some part of the nervous centre. Dr. Liveing, to whose exhaustive work I am considerably indebted, considers that, in a typical case, the disturbance takes place first in the optic thalamus, and passes backwards and downwards, reaching to the nucleus of the vagus below; for, as he observes, in a model seizure, the visual disorder is always the initial, the headache the middle, and the vomiting symptom the final. Where morbid intellectual phenomena and disorder of speech occur, the affection radiates from the thalamus to the hemispheric ganglia, and where emotional phenomena occur, to the mesocephale.

Though the affection is seated in the nervous centres, yet it must be recollected that both the frequency and the severity of the attacks depend on peripheral exciting causes, due to the stomach, intestines, liver, womb, etc. Even when the affection is strongly developed and the periodic attack recurs apparently spontaneously, remote exciting causes may render the seizures more frequent and severe, nay, in many cases, the affection may be so slight, that it lies dormant till roused into activity by some near or distant irritation, which being removed the seizures cease.

The successful treatment of megrim depends less on change to be effected in the disordered nervous centres than on the removal of the exciting cause. The treatment of megrim, therefore, falls under three heads.

1. The treatment of the central nervous affection.
2. The removal or prevention of exciting causes.
3. The treatment of the paroxysm.

Many remedies act in a twofold or even a threefold way. Thus bromide of potassium is often extremely serviceable in two ways. It is very useful in cases where the seizure is due to uterine disturbance, as in menorrhagia and dysmenorrhœa. Sometimes the attacks are more severe and frequent, arising from the exhausted state of the nervous system. Perhaps from overlong town residence, or from mental troubles, the patient becomes irritable, depressed, nervous, excitable, with broken sleep, harassed by dreams. The ensuing general depression increases the headache. Now, bromide of potassium soothes the patient, and, by promoting refreshing sleep, strengthens the nervous system, and thus lessens the frequency and severity of the headaches. Bromide of potassium, moreover, is serviceable in the paroxysm itself, for it may produce several hours' sleep, from which the patient awakes free from headache.

The pain of megrim is situated in the fifth nerve: and, remembering how closely megrim is allied to neuralgia, and how useful hydrate of croton-chloral is in facial neuralgia, I have been induced to try this remedy for megrim, and have found it useful in cases of which the following may be taken as a type.

A woman has been subject for years to nervous sick-headache; then, owing to some great trouble, or to excitement, fatigue, or flooding, or prolonged suckling, or more often at the change of life, the headache becomes much more severe, becomes continuous for weeks, perhaps months, and is intensified greatly by fatigue, excitement, or at the catamenial period. If not actually continuous, the headache comes on daily, lasting, perhaps many hours, or several attacks may each day occur. The pain is often intense, and whereas, previous to the oncoming of this intensified form of headache, the pain was probably limited to one brow, it now affects both and, perhaps, the greater part of the head. The skin is generally very tender. There is also a sensation of bewilderment, or, as some term it, a stupid headache, and the patient often says she feels as if she should "go out of her mind." The sight may be dim, especially during the exacerbations of pain. Some patients of this class are very excitable and irritable, and are upset with the slightest noise. Nausea and even severe vomiting may occur with each exacerbation of the pain. Five grains of croton-chloral every three hours, or even oftener, will give in most cases considerable relief. I need hardly say, that the drug does not entirely free the patient from her attacks; but, in one or two days, the pain ceases to be continuous, then the attacks recur, though only once or twice a week, the interval gradually extending till an onset occurs only every week, then about every fortnight, or even longer, till the illness assumes its old type and periodicity. In some cases, a week's treatment suffices to bring back the headache to its original type of an attack once in three or four weeks. Then the croton-chloral appears to be far less serviceable, manifesting but slight effect on the periodical attacks. In many cases of ordinary periodical headache, the patients say that, in the milder forms, the drug distinctly lessens the severity and duration, but in the severer forms it is without effect, even when sickness is absent. In cases accompanied by severe vomiting and retching, croton-chloral is useless, being speedily rejected.

Croton-chloral, I have found, will relieve the lighter attacks, some delicate and nervous women experience after any slight fatigue or excitement.

In the continuous sick headache just described, as the pain grows better so the cutaneous tenderness disappears. It seems to me, that, in many instances, two kinds of headache co-exist, one sometimes predominating, sometimes the other. One appears due to affection of the cutaneous nerves, and is generally accompanied by tenderness. Patients describe the other as a "stupid headache," "a feeling of bewilderment," "a bewildering headache." After the dispersion of the first form by croton-chloral, this stupid headache often continues, but is ordinarily relievable by bromide of potassium. Indeed in many cases, I have found it useful to combine these remedies. Bromide of potassium itself is often sufficient in certain sick headaches; for instance, if the other symptoms point to the use of this drug, as when in addition to the bewildering or stupid headache, the patient complains of broken sleep, is harassed with disagreeable or frightful dreams, is prone to be very irritable and excitable and feels as if she should "go out of her mind." Bromide of potassium too is often useful where the continuous or almost continuous form of sick-headache is associated with, and is probably due to, uterine derangement, as menorrhagia. The drug's efficacy is not due to simply checking the loss of blood, and so indirectly improving the health, for it manifests its efficacy before the occurrence of the next flooding. In cases like this it may be usefully combined with cannabis indica.

I have already referred to the effect of croton-chloral on the shooting pains in the occipital and auricular nerves, but I wish again to revert to them, because they appear in many cases to be closely allied to megraine, being often induced by the same circumstances. Thus, they are more common in women especially when in depressed health or subject to worry. Sometimes the attacks are associated with nausea and even sickness. The pains occur in sharp stabs running in the course of the nerve and not in enduring paroxysms. Croton-chloral in such cases is often very useful, although it may fail where the health is greatly depressed, and where there is much anæmia. Sometimes the symptoms indicate the employment of bromide of potassium.

Liebreich who recommended croton-chloral as a soporific, and gives as much as sixty grains for a dose, thinks it superior to hydrate of chloral, since whilst it produces sleep it does not affect muscular tone, nor interfere with the circulation or respiration. He thinks it applicable in cases of heart disease. Much smaller doses are said to produce sleep; thus, Dr. Yeo states that sometimes two grains will suffice. I have given five and ten grain doses in a considerable number of cases but never knew either dose to produce sleep, or even drowsiness.

Dr. Yeo recommends croton-chloral in the "distressing night cough of phthisis."

There are many conflicting statements concerning the dose of croton-chloral. According to some writers croton-chloral is treated as a powerful and dangerous remedy, requiring to be given with great care; but this is certainly erroneous. Mr. Baker's patients obtained relief from two or three hourly doses of one grain. Dr. Legg administered it in five, ten, and twenty-grain doses. I have usually given five grains every two or three hours and sometimes hourly. In one case—a delicate woman, I gave it hourly in five grain doses for a fortnight, without producing drowsiness or any other apparent effect beyond its influence over pain. Usually five grains every three hours is sufficient, giving freedom from pain in a few hours, though in some unusual cases relief may not be obtained for two or three days. After discontinuing the drug slight pain may return, but it yields again to the medicine. It sometimes promptly relieves toothache, though not uncommonly it fails; and I have known it relieve widespread neuralgia of the fifth, leaving unaffected the accompanying toothache. Indeed I have known toothache to come on during the use of this remedy in five-grain doses every three hours.

NITRITE OF AMYL.

To Dr. Brunton belongs the credit of first using this remedy, and the rare merit of inferring correctly its therapeutic effect from its physiological action. It must give him the highest satisfaction to know how great a boon his scientific insight has provided for the hitherto almost helpless patients under the anguish of angina pectoris.

In thirty to forty seconds, whether inhaled, subcutaneously injected, or swallowed, it flushes the face, and increases the heat and perspiration of the head, face, and neck. Sometimes the increased warmth and perspiration affect the whole surface; or while the rest of the surface glows the hands and feet may become very cold; and this condition of the extremities may last many hours. It quickens the pulse in a very variable degree, sometimes, as Dr. Talfourd Jones points out, doubling its pace. Jones finds that this augmented pulse-beat precedes the flushing by a few seconds. It causes the heart and carotids to beat strongly, and the head to feel full and distended "as if it would burst" or "as if the whole blood were rushing to the head" and sometimes produces slight breathlessness and cough. It often causes slight giddiness, mental confusion, and a dream-like state. When given to animals in a deadly dose, the breathing becomes quick; there is great weakness; loss of reflex irritability and death ensues from arrest of respiration, but sensation and consciousness remain unaffected.

The most characteristic effect of this drug is its influence on the vascular system. It relaxes the whole arterial system, greatly reducing arterial pressure. The reduction of arterial pressure is due mainly to the great dilatation of the arterioles and after large doses to depression of the heart. How does it dilate the arterioles? It will dilate the arterioles even after section of the cord just below the medulla oblongata; hence it has been concluded that it does not act by paralysing the vasomotor centre which formerly was supposed to be situated between the calamus scriptorius and the corpora quadrigemina. It must therefore act either on the vaso-motor nerve trunks or on the muscular coat of the arteries. Some have concluded that it affects the arteries. Brunton believes it partially paralyses the sympathetic ganglia and their motor nerves.

Early experiments seemed to show that the vaso-motor centre is situated in the medulla oblongata. Thus:—

1. Irritation of the region just indicated induces general contraction of the arteries.

2. If this centre is destroyed, the arteries remain widely dilated.

3. So long as the cord is undivided, irritation of any sensory nerve causes contraction of the arteries, the impression being conveyed to the vaso-motor centre, and reflected to the arteries; but if the communication between the vaso-motor centre and the arteries is severed by section of the cord below the medulla oblongata, then irritation of a sensory nerve no longer contracts the arteries.

Recent experiments of Nüssbaum, if correct, show that in the frog, and therefore probably in other animals, the vaso-motor centre is not situated solely in the medulla, but extends the whole length of the spinal cord, for after its section below the medulla oblongata, time being allowed for the animal to recover from the shock of the operation, irritation of a sensory nerve will cause contraction of the arteries.

If Nüssbaum's observations are confirmed they would seem to show that nitrite of amyl may act through its influence on the vaso-motor centre.

The paralysing effect on the arterial system is well shown by the sphygmographic tracings, the flushing of the face, and the increase in the size of visible arteries like the temporal, which often becomes notably large, sometimes, indeed, doubled in size, and branches previously invisible become plainly apparent; and by the interesting fact observed by Talfourd Jones, who, while cupping a patient over the loins and finding that blood would not flow, administered nitrite of amyl by inhalation, when the cuts immediately began to bleed freely. After an inhalation the larger arteries are slower in recovering their normal size than the capillaries, a phenomenon I have often observed in the temporal artery, which remains enlarged half a minute or longer after the blush has quite left the face.

Dr. Horatio Wood has shown that the loss of reflex action and of voluntary power occurring after large doses, is due to the depressing action of the drug on the motor tracts of the cord and to a slight extent on the motor nerves and on the muscles. It appears to have no effect on the sensory tracts of the cord nor on its co-ordinating centres. It abolishes reflex action, but whether it depresses the reflex function of the cord is uncertain, as it may act simply on the motor part of the cord.

The inhalation or subcutaneous injection of nitrite of amyl produces in rabbits sugar in the urine with a considerable increase in the quantity of urine. It has been experimentally shown that diabetes is produced by dividing the sympathetic nerve of the liver and thereby causing dilatation of the hepatic vessels, so increasing the quantity of blood passing through the liver. Probably nitrite of amyl acts by its influence over the vaso-motor nerves increasing the quantity of blood passing through the liver.

Dr. Horatio Wood finds that nitrite of amyl lowers the temperature by checking oxidation. Dr. H. Wood finds that the inhalation of nitrite of amyl changes both arterial and venous blood to a chocolate colour, due as Dr. Arthur Gamgee shows, to the formation of nitrite-oxyhæmoglobin, and that by this means the ozonizing property of the blood and hence oxidation of the tissues are lessened. It has been sought to explain all the effects of nitrite of amyl on the animal economy by this influence on the blood, but, as Dr. H. Wood points out, this cannot be an adequate explanation, for nitrates generally affect the blood in the same way, and yet do not produce the symptoms following the use of nitrite of amyl; moreover the withholding oxygen from the system produces symptoms very different from those due to this drug.

R. Pick, from observations on himself and others, finds that after inhaling amyl, if the eye is fixed on a spot on a blank wall, the spot itself with the surrounding surface appears of a yellowish hue, the yellow circle being encircled by a violet blue halo, with undulating lines at the edge.

Dr. Brunton first employed nitrite of amyl with signal success in angina pectoris, and found it more effective than any other remedy he had tried in this painful and dangerous disease. During an attack his patient suffered from throbbing of the heart and carotids as high as the ears, with severe precordial pain extending to the right arm, though the usual characteristic "sense of impending death" was absent. The pulse was slightly quickened and the sphygmographic tracing became modified, for as Dr. Brunton states, "as the pain increased the curve became lower, both the ascent and descent more gradual, and dichrotism disappeared. This form of curve clearly indicates that the arterial tension is much increased, and can I think be due only to contraction of the small systemic vessels." The increased tension first led Dr. Brunton to employ nitrite of amyl. In the case in question he attributed the attack to spasmodic contraction of some, if not all, the small systemic and pulmonary vessels, a state of arterial tension which gave way to the nitrite when the pain disappeared. In recurring attacks the patient inhaled the nitrite of amyl and always obtained instantaneous relief.

Dr. Anstie reports the marked relief of a well-marked case of angina, by means of this treatment, "the first sniff," he says, "produced after an interval of a few seconds the characteristic flushing of the face, and sense of fulness of the head; the heart gave one strong beat, and then he passed from the state of agony to one of perfect repose and peace, and at his usual bed-time slept naturally. This experience has, I am happy to say, been repeated on several occasions, and with this fortunate result; that so confident now is the patient of being able to cut short the paroxysm that he has discarded all use of ether, and greatly reduced his allowance of stimulants." Dr. Talfourd Jones also finds nitrite of amyl very efficacious in angina. Since the previous editions of this work, it has been largely used in angina with considerable success; indeed, in the majority of cases no other remedy affords so much relief. As might be expected, it is not uniformly successful. I have never known it fail to give some relief, though sometimes this is very transient, the pain returning as soon as the physiological effect of the drug passes away. Thus, in one case due, as we discovered after death, to aneurism of the heart immediately below the aortic valve, an inhalation always arrested the pain, but after a few seconds or minutes it returned, even, if the administration were several times repeated, as severely and persistently as though no amyl was used. In another case whilst it always arrested the paroxysm, it took ten minutes to give relief and seemed in no way superior to a full dose of ether, which the patient preferred, as the amyl produced so much giddiness and sensation of fulness in the head. In five other cases, however, it proved strikingly successful. In one desperate case, the slightest exertion brought on intense pain, but armed with amyl the patient could always at once cut short the attack, so that now he can walk several miles, though during his journey he is obliged to employ the amyl several times. It has appeared to me that by summarily checking the paroxysm the attacks come on less frequently and less severely, and after a time require much smaller quantity to control the pain; so that amyl really contributes to the prolonged relief of these unhappy patients.

In some cases the nitrite of amyl either loses its effects or the severity of the attack increases so that the drug must be taken in increasing quantities and at shorter intervals. Two of my patients kept the bottle nearly always in their hands, sniffing the drug every few minutes, and one used an ounce every week for over a year.

Dr. Talfourd Jones found it remarkably successful in very severe attacks of asthma, removing the dyspnœa immediately and averting its return; others too have found it very useful. In my hands it has not proved successful, for although it always arrests the paroxysm, yet on cessation of the physiological effect the dyspnœa has returned. Jones found it beneficial also in a case of cardiac dyspnœa, accompanied by extreme anasarca, due to a dilated and hypertrophied heart.

Dr. Talfourd Jones advises inhalation of the nitrite in syncope and thinks it should be of service in the paroxysms of whooping cough. It is useful in neuralgia, at least in neuralgia affecting the fifth nerve, often easing the pain at once, and a single administration will sometimes avert further attacks, but so signal a result as this is probably very exceptional. Dr. Richardson finds that nitrite of amyl arrests in frogs the convulsions due to strychnia. In this way he has saved their lives; hence in strychnia poisoning and tetanus he advises a trial of the nitrite, either by inhalation or subcutaneous injection.

It is better to administer the amyl by inhalation, for, according to Brunton, it will not answer with anything like the same certainty when given by the stomach; for in the striking case of angina pectoris just cited he gave ten minims in brandy by the stomach with the effect of staying the pain for only a short time, but a single inhalation afforded perfect and permanent relief. It should be borne in mind that it affects some persons much more than others; one individual being able to inhale five or ten drops from a handkerchief, or to breathe the fumes from the bottle held close to the nose, while a whiff from the bottle held at a distance will affect another with great giddiness, much mental confusion, and general weakness. Jones directs five or ten drops poured on a handkerchief, or the fumes from the bottle held close to the nose, to be inhaled till the pulse quickens; but this dose is far too potent for some persons, especially feeble and sensitive women, who in the first instance should inhale a much weaker dose. As Jones points out, patients become habituated to it, so that after a while it must be inhaled several times before it affords relief. This habituation is well exemplified in the internal administration of the remedy. By exposure it gets "flat" and loses its efficacy.

Nitrite of amyl is generally considered a powerful and even dangerous remedy requiring to be watched with great care, and given in a definite quantity. I am sure it is not nearly so dangerous as is generally imagined, though it is true that nervous, sensitive women are far more powerfully affected by it than men. No doubt its administration at first should be conducted by a doctor, in order to ascertain how far the patient is susceptible to its influence, and that the patient may learn when he ought to discontinue the inhalation, but after one or two trials patients soon learn how to administer it to themselves. I have now five patients with angina pectoris, each of whom carries a small bottle of this medicine, and on the first warning of an attack, whether walking or standing, each at once begins to sniff at the bottle. My patients have done this for months, and one for just a year, using the inhalation many times daily, so that he consumes about two drachms a fortnight with still unfailing relief. Except in relieving the angina, the amyl seems to produce no other effect on the system.

Dr. Jones recommends a trial of it in epilepsy. To an epileptic patient, who, in addition to severe and repeated attacks, suffered from much mental confusion and was haunted many times a day with an indescribable dread and sensation as of an oncoming fit, although it came on only once or twice a week, I gave 3 drops thrice daily, and an additional dose on the earliest warnings of a fit, with the effect of diminishing considerably the frequency of the attacks and entirely removing the harassing sensations. Dr. Crichton Browne has lately published some valuable observations on the inhalation of nitrite of amyl in this disease. In two rabbits made artificially epileptic, he prevented the oncoming of the convulsions which otherwise follow the application of the electrodes to the brain, by making them inhale nitrite of amyl. He likewise arrested epileptic attacks on the occurrence of the aura before the onset of the fit and has even cut short the fit after its commencement. By the same means he has rescued several patients out of that desperate plight called status epilepticus—a condition consisting essentially of a succession of fits, linked together by intervening unconsciousness, the fits recurring with increasing frequency, till at last no sooner is one fit ended, nay, before it has finished, another fit begins.

Amongst other successful cases, Dr. Weir Mitchell reports one, where the inhalation was used immediately the aura was perceived, and other instances where the spasms lasted for hours, one fit following another. I have given this remedy with considerable success to epileptic out-patients, in whom the attacks were very frequent. In some it has appeared to be more useful than full doses (20 to 30 gr.) of bromide of potassium thrice daily, in another case whilst it decidedly lessened the frequency of the attacks, it was less serviceable than bromide of potassium. I have given it in two to five minin doses suspended in mucilage, every three hours, or three times a day, without inducing any unpleasant effects, not even in some cases causing flushing, whilst other patients have flushed with each dose, but only whilst swallowing it.

The patient should take the medicine whilst lying down; and as some patients, especially women, are very readily affected by the drug, it is well in the first instance to give it in smaller doses, but until the remedy is pushed to two and in some cases to five minims every three hours, I have failed to obtain conspicuous results. Dr. Crichton Browne maintains that epileptics are more sensitive than others to inhalation of amyl. I imagine that this medicine will be found useful only in frequent attacks and that it is not available when the fits come on at comparatively long intervals, as three weeks or a month.

Inhalation of nitrite of amyl has been recommended in sick headache, and one successful case is reported by O. Berger.

I have used this remedy extensively with considerable success in cases of the following kind:—A woman, perhaps from the sudden arrest of menstruation, or through depraved health, or nervous depression, or, more frequently, at the change of life, suffers from frequent attacks of flushings or "heats" starting from various parts, as the face, epigastrium, &c., thence spreading over the greater part of the body. The face, and even the backs of the hands, are often deeply reddened, the veins of the hands in some cases dilating to double the previous size. Although the patient feels deeply flushed, sometimes the skin remains natural. The sensation of heat may be so urgent that the patient opens her clothes or removes the greater part of the bed covering, and even throws open the window in the coldest weather. These heats may last a few minutes only, or an hour or more, and may be repeated many times a day. They are generally followed by perspiration, often very profuse, at other times the skin remains dry, the attacks are then commonly termed "dry heats." The "heats" are often accompanied by great throbbing throughout the whole body and followed by much prostration, the patient seeming scarcely able to rouse herself. After the heats pass away, the skin sometimes becomes cold and clammy and may turn very pale. The least exertion or excitement may bring on these heats, and such a patient generally complains of cold feet and sometimes of cold hands. The flushings are occasionally peculiarly and abruptly limited, reaching to the thighs, knees or elbows, and while all the parts above these feel burning hot, the parts below feel icy cold; sleep too is often much broken, the patient waking with frequent starts, and in the morning feeling unrefreshed. Sometimes they occur chiefly at night. In many cases palpitation or "flutterings at the heart" occur on the slightest excitement, or even without apparent cause.

Nitrite of amyl will prevent or greatly lessen these flushings or "heats," and avert the profuse perspiration, throbbing of vessels and great prostration. Sometimes it warms the feet and hands and controls the fluttering of the heart, but in most cases it leaves these symptoms unaffected, and for their cure other remedies, as iron, are required. Amyl will also remove the giddiness, confusion of mind, heaviness in the head, and even headache; it generally produces calm refreshing sleep.

When the flushings and perspiration are slight, this remedy is scarcely needed; moreover the perspirations are generally considered vicarious and beneficial at the change of life. These symptoms, in many cases, form only a minor part of the troubles of the patient, who may complain of great sinking at the epigastrium, or severe pains in different parts of the body, and other sufferings incident to this period, over which nitrite of amyl has little if any influence; but when flushings constitute the chief part of the patient's troubles this medicine is most serviceable.

The nitrite of amyl in ten days completely cured a woman who for three years had been horribly tormented with singular attacks, repeated several times daily, of severe burning sensation over the loins, whence a glow of heat spread over the whole body, followed by perspiration, the burning sensation being so unendurable that she was constrained to open the window at night even in the winter, and sometimes to rush out of doors.

For the symptoms just described, I have generally administered this drug by the stomach, though inhalation answers as well. In respect of dose it must be borne in mind that like glonoine (nitro-glycerine) its effects vary very greatly with different persons, one, two, or even three minims producing in some only flushing of the face and slight giddiness, while with others even a drop will induce various disagreeable symptoms. Thus one woman immediately after a drop dose turned deadly pale, felt very giddy, and then became partially unconscious, remaining so for ten minutes. In another patient the same dose produced a sensation as if "a vapour spread from the throat through her head" and rendered her quite powerless for one or two seconds. A third of a minin dose sometimes excites great nausea or a tickling in the throat; and one delicate woman after one thirtieth of a drop, passed for a few minutes after each dose into a trance-like state, everything to her seeming unreal, and the breathing becoming rather panting. The author began with a minim dose, but was obliged to reduce this quantity, and he ultimately found that, for the most part, these patients can bear one third of a minim without any disagreeable symptoms, but that a tenth, nay, even a thirtieth of a minim will in some patients counteract the flushing. It may be dissolved in rectified spirit, two minims to the drachm, and of this the dose is three to five drops on sugar every three hours, with an additional dose as soon as a flush begins. Relief generally ensues immediately, but sometimes not till the medicine has been taken for a week. As the patient grows accustomed to the remedy the dose must be increased.

It is interesting to observe the therapeutical similarity of some of the effects of nitrite of amyl to those of bromide of potassium, though the physiological action of these drugs is different, amyl dilating, whilst bromides are generally considered to contract the blood-vessels. Amyl depresses the motor centre of the cord, but leaves the sensory unimpaired. Bromides depress the reflex and sensory parts of the cord, leaving the motor tract unaffected. Both are serviceable in many of the distressing symptoms occurring at the menopause as irritability, depression of spirits, sleeplessness, distressing dreams, heats, flushings, perspirations and exhaustion. They are both useful in epilepsy. In epilepsy the starting point of the attack is supposed to be the medulla; that some peripheral irritation acting on this part excites spasm of the glottis and of the blood-vessels of the brain producing partial asphyxia and unconsciousness, and that the asphyxia excites the general convulsion. Bromides depress the activity of the cord and of the medulla, so that the peripheral irritation cannot produce these effects. Nitrite of amyl is supposed to check or arrest the contraction of the arterioles, and so to prevent the unconsciousness, but this would not explain its power to prevent the other phenomena. It is difficult to imagine that the influence on the laryngeal spasm and general convulsion can be due simply to the depressing action of the nitrite of amyl on the motor centres of the cord, as these are affected only by very large doses whilst the inhalation of a few drops will stop the convulsions.

CAMPHOR.

At the temperature of the body camphor is solid, but it slowly volatilizes even at a lower temperature. But little soluble in water, it freely dissolves in oils and alcohol. Camphor destroys most plants, except those of the lowest organization, as the fungus commonly called mould. It is said to be poisonous to fleas, bugs, spiders, and other insects. Camphor excites redness and heat, indeed slight inflammation in the unbroken skin, and of course irritates more powerfully wounds and delicate structures like mucous membranes, and may produce, not only active inflammation, but even sloughs and ulcers. It has been applied to stimulate indolent sores. It is a useful addition to dusting powders to allay the heat, tingling, and itching of eczema and intertrigo. Camphor is a common ingredient of tooth powers, and is used as a corrective of foul breath.

Camphorated alcohol has been recommended as a remedy for boils at their earliest stages, applied three times a day for half a minute, afterwards letting the skin dry and then smearing it with camphorated oil. It is said that a few applications will usually disperse the coming boil.

Inhaled, or taken by the stomach, camphor exerts a decided influence on "cold in the head." Employed at the beginning of an attack (it is useless after the first stage) camphor sometimes arrests an ordinary cold, and failing this, it abates its violence obviating or diminishing frontal headache, and restraining the sneezing and running at the nose.

Camphor inhalations are sometimes useful in that troublesome and chronic complaint characterized by seizures of incessant sneezing and profuse watery running at the eyes and nose, the patient remaining well in the intervals. These attacks may occur daily, beginning early in the morning and may last for a few minutes only, or persist for several hours; and they may occur at any hour of the day, recurring several times daily. Sometimes several days intervene between the attacks, which may last twenty-four hours, or even longer. They are generally accompanied by severe frontal headache, and in some instances an itching of a point inside the nose denotes the imminence of an attack. This affection lasts for years.

In catarrh, and in this unnamed affection the patient should either sniff up finely-powered camphor, or inhale by the nose some of the alcoholic solution poured on a handkerchief or into boiling water; but when boiling water is used it is needful to protect the eyes from the camphor vapour, to obviate smarting and inflammation. At the same time he should take four to six drops of the alcoholic solution of camphor every fifteen minutes for the first hour, and hourly afterwards.

For drowsiness or headache occurring at the change of life, or from perverted action of the uterus, Dr. Tilt orders eau de Cologne saturated with camphor to be rubbed into the head.

Camphor excites in the mouth and stomach a sensation of coldness, followed soon by a sensation of warmth. Large doses excite epigastric pain, nausea, and vomiting. After death from poisonous doses, the stomach and intestines are reddened and sometimes even ulcerated, the amount of mischief depending on the mode of taking the camphor, which, if swallowed in solution, quickly passes into the blood, the stomach being but little affected; but if swallowed in the solid form, owing to its high melting point, it remains long enough in the stomach to excite severe inflammation, and most of it escapes undissolved with the motions.

Few if any remedies are comparable to camphor in summer diarrhœa and cholera. Its benign influence in cholera is most conspicuous; for it generally checks the vomiting and diarrhœa immediately, prevents cramps, and restores warmth to the extremities. It must be given at the very commencement, and repeated frequently, otherwise it is useless. Four to six drops of strong spirits of camphor must be given every ten minutes till the symptoms abate, and hourly afterwards. It is a good plan to mix it with a little brandy, but it acts admirably alone.

Dr. George Bird employs spirits of camphor with good results in the acute diarrhœa of infants. He administers it in milk.

Camphor generally restrains the diarrhœa excited by the effluvia of drains. Some persons, especially women, on exposure to cold, suffer from diarrhœa accompanied with severe cutting pains. Standing on cold objects is especially liable to excite this diarrhœa. The pain may be very severe, continuing till the bowels have acted three or four times. Camphor generally relieves the pain, and restrains this diarrhœa.

Camphor readily passes into the blood, and manifests itself there and in most of the organs of the body by its odour. Its influence on the blood is unknown. Its influence on the heart appears to be capricious. Large doses often slacken, sometimes quicken, and generally weaken the pulse. Moderate doses, it is said, quicken and strengthen the pulse. Large doses sometimes disturb the brain, causing at first increased activity with a rapid flow of pleasant ideas; but subsequently, and in some cases even at first, camphor produces great faintness, giddiness, noises in the ears, much delirium, and even convulsions, with coldness of the surface, shrunk features, and clamminess of the skin. Large doses often induce some smarting and pain of the urinary organs, with urgent desire to pass water.

It is mainly given in adynamic fevers, and according to Graves and others, it is a very valuable remedy. It is said to strengthen while reducing the frequency of the pulse, to moisten the skin, and check the delirium, especially when of a low and muttering character. To control delirium it must be given to the extent of twenty grains or more every two or three hours, and its effects must be watched. Some practical authorities, however, deny the efficacy of camphor in fever delirium.

It has also been recommended in melancholia, in spasmodic affections, in nervous palpitation, and in hiccup.

It is reputed on high authority, that considerable doses of camphor will control inordinate sexual desire. It is said to relieve strangury. Drachm doses of the spirit will relieve chordee.

Camphor, is eliminated by the breath, probably with the perspiration, and a small proportion with the urine. The irritation it produces in the urinary mucous membrane, and the small amount of camphor separated by the urine, has led to the assumption that some of the products of its decomposition in the body escape with that secretion and in their passage irritate the mucous membrane; but on this point nothing definite is known, and at present there is no proof that camphor is consumed in the body.

TURPENTINE.

Turpentine applied to the skin excites a sensation of warmth with some redness; and if the application is sustained, blistering takes place. It is in common use as a rubefacient and counter-irritant. Over a flannel wrung out in hot water some turpentine or turpentine liniment may be sprinkled, and applied till it produces redness, tingling, and smarting. It is well to bear in mind that as the smarting arising from the application of a turpentine stupe, goes on augmenting for some time after its removal, it should be kept on no longer than just sufficient to excite a moderate degree of pain. An equal quantity of yolk of egg and turpentine is a useful form, to be dabbed on the skin with a piece of sponge. Turpentine stupes may be employed as a rubefacient, for the same purposes as a mustard poultice.

Turpentine in the stomach excites a sensation of warmth, and large doses sometimes produce nausea and vomiting. It generally but not invariably acts as a purgative; and if, after large doses, purgation does not take place, serious symptoms sometimes arise from the absorption of the turpentine, and from its action on the organs at a distance from the intestinal canal. Thus, when administered in considerable doses, it is desirable to give, either simultaneously or soon afterwards, some more active and certain purgative, as castor oil. Even after large doses, the stomach and intestines of animals have been found free from inflammation.

This drug is successful as a tapeworm poison, but it has now given place to milder and more efficient remedies.

Turpentine injected into the rectum will destroy threadworms, but many other substances are just as effective vermicides.

In staying hæmorrhage from the stomach, arising from chronic ulcer or other causes, from the intestines in typhoid, etc., few remedies are more successful than turpentine given in small doses of five to ten drops, very frequently repeated. Later on we shall speak of the use of turpentine in controlling hæmorrhages from other organs.

Turpentine proves useful in certain states of typhoid fever, probably from its direct action on the intestinal mucous coat. Thus Dr. Wood has drawn attention to its value in ten-minim doses repeated every two hours, when the tongue parts with its fur in flakes, and instead of becoming and remaining moist, looks dry and glazed, a condition usually observed towards the end of the disease, and accompanied always by an increase of the tympanites and an aggravation of the other symptoms. In "the course of twenty-four or at most forty-eight hours some amelioration of the symptoms may be observed. The tongue becomes gradually moister, and covers itself with a whitish fur; the tympanitic distension ceases to augment, and after a time diminishes; the pulse becomes less frequent and the skin less dry and harsh, and the patient enters slowly but regularly into convalescence often without any other remedy. As the case improves, the quantity of the oil should be diminished, but care should be taken not to omit it too hastily." Dr. Wood further says, "I will repeat, that oil of turpentine may be used, with great hope of benefit, in any case of enteric fever in the advanced stage, with a dry tongue."

Dr. Graves employed it in the same disease, in drachm doses every six hours in extreme tympanites, and he pointed out that the remedy is of no use if, before and during the production of the flatulent distension, there is diarrhœa, when acetate of lead is invaluable. With the tympanites there is very often much prostration, with muscular trembling, and picking of the bedclothes, and low, muttering delirium—symptoms all, according to Graves, benefited in many cases, by the use of turpentine.

Turpentine passes readily into the blood, and may be detected in the breath and sweat, and in an altered state in the urine, giving to this excretion an odour of violets or of mignonette.

In large quantities, and especially if it fail to purge, and thus escape promptly by the rectum, turpentine produces in most persons some excitement, with giddiness, confusion of sight, quickened pulse, and, in extreme cases, insensibility, with dilated pupils. In many instances it produces bloody and scanty urine; or, indeed, it may suppress this secretion; occasionally it excites pain along the urinary tract; with frequent and painful micturition.

As we have said, it is very efficacious in bleeding from the various organs of the body, as the lungs, nose, uterus, kidneys, and bladder. A drachm should be given every three hours: a dose which sometimes causes sickness, diarrhœa, and even blood in the urine: but on discontinuing the drug the blood soon disappears. Given to check bleeding from the kidneys, as in Bright's disease, it must be administered in very small quantities. It is also reputed to possess the power of checking bleeding in the hæmorrhagic diathesis, and to be useful in purpura.

Puerperal fever has been treated with large doses of this medicine, but authorities are divided as to its usefulness.

According to some authorities, it has been employed with great success in sciatica, in half-ounce doses, given for four or eight successive nights, when, if it fail to give relief, it may be pronounced useless in that particular case.

Dr. George Bird finds that in 20-drop doses, thrice daily, it is markedly serviceable in lumbago.

It is asserted that turpentine is an antidote to phosphorus, and Dr. Letheby says, that at a lucifer-match factory at Stafford the workmen prevent necrosis of the jaw by wearing near their breasts a small open vessel containing turpentine.

The experiments of Personne on fifteen dogs support this view. To five dogs he gave phosphorus alone, and they all died. To five others, an hour or two after the phosphorus, he gave turpentine and only one died. To five others he gave turpentine immediately after the phosphorus and only one dog died. These experiments, however, are not so satisfactory as they easily might have been, as he does not appear to have given an identical dose of phosphorus in all his experiments. Personne thinks that phosphorus produces asphyxia by becoming oxidized and abstracting oxygen from the blood. Pyrogallic acid absorbs oxygen from the blood, and Personne asserts that it produces the same symptoms and *post-mortem* appearances in dogs as phosphorus. He thinks that turpentine prevents the oxidation of phosphorus, so that it is eliminated unchanged without inflicting injury on the body.

Köhler confirms Personne's statement of the antidotal power of turpentine, but controverts his explanation of its action. He gave to twenty-five animals, from 0·006 to 0·09 grms. of phosphorus and 4·5 grms. of turpentine, and on killing the animals the tissues showed no fatty degeneration or other signs of phosphorus poisoning. Köhler says that a compound of phosphorus and turpentine is formed, which is eliminated through the kidneys, giving to the urine a smell like opodeldoc and not of violets.

Some experimenters deny the antidotal virtue of turpentine. These contradictory statements are now reconciled by the obervation of Jonas who finds that pure turpentine has no effect n phosphorus, whilst French turpentine forms a spermacetti rystalline mass—turpentine-phosphoric acid which is said to be harmless and to be eliminated by the kidneys unchanged. Experiments with the different kinds of turpentine as antidotes to phosphorus confirm these conclusions.

Turpentine is reputed to be diuretic, and is sometimes administered in small doses with this intent in Bright's disease.

It has been used in chronic cystitis, in gonorrhœa, and in gleet.

It has been given, with apparent advantage, in biliary colic.

Group containing :—

NUTMEGS.
CLOVES.
CANELLA BARK.
CINNAMON BARK.
CAJEPUT OIL.
OIL OF ANISE.
FENNEL FRUIT.
CARAWAY FRUIT.
CORIANDER FRUIT.
DILL FRUIT.
ELDER FLOWERS.
LAVENDER OIL.
OIL OF ROSEMARY.
OIL OF SANDAL WOOD.
OIL OF PEPPERMINT.
OIL OF SPEARMINT.
OIL OF RUE.
OIL OF LEMONS.
CUBEBS.
BUCHU LEAVES.
BALSAM OF TOLU.
BALSAM OF PERU.
COPAIBA.
MEZEREON.
SASSAFRAS.
STORAX.
JUNIPER.
BENZOIN, etc.

This group consists of volatile oils, or substances containing volatile oils. Some of the members containing a bitter constiuent, are tonics.

The ethereal oils penetrate the cuticle, and excite slight inlammation. Some are employed as rubefacients to rheumatic and gouty joints, to the face in toothache, etc. Dr. Alfred

Wright of Finchley says that in China he learned from the natives the practice of painting oil of peppermint on the face in faceal neuralgia. He uses it also for gout, the relief it gives in both instances being almost instantaneous. There is a German quack anti-neuralgic liniment which consists chiefly of oil of peppermint. Balsam of Peru is a useful adjunct to ointments for broken chilblains. Dr. Robertson, of Cheltenham, strongly recommends the local appplication of cajeput oil for chilblains, stating that sometimes one application will effect a cure. Dr. Copland, in his dictionary, states that in the form of ointment, for which he gives a formula, it stimulates the growth of the hair.

All the essential oils destroy lice, whether situated on the head, trunk, or pubis; but in "louse-disease" oil of rosemary and powdered pyrethrum are generally preferred·

Many excellent authorities extol storax and Peruvian balsam in itch. The following preparations are very useful:—Storax, an ounce; olive oil, two drachms. Or, rectified spirit, two drachms; storax, an ounce; olive oil, a drachm; the first two ingredients are mixed, and the olive oil added to them. The whole body, except the head, is carefully rubbed with either compound. One application it is said kills the insects; but, to avoid the risk of failure, it is better to repeat the application in twelve or twenty-four hours. These applications cause no irritation of the skin, and they possess the additional advantage of an agreeable odour. Although not necessary to the success of this treatment, yet, for the sake of cleanliness, a warm bath should be given before and after the inunctions.

Dr. McCall Anderson praises storax highly, asserting that it is as efficacious as sulphur, while unlike sulphur instead of irritating it soothes the skin.

Compound tincture of benzoin painted on the skin or mixed with water sometimes allays itching from urticaria, eczema, &c. Benzoic acid dissolved in spirit of Eau de Cologne is also very useful in urticaria; a drachm added to boiling water, and used as an inhalation night and morning, is often useful in bronchitis and even in chronic phthisis—easing cough and lessening expectoration.

The members of this group have a warm, and many of them an agreeable taste. Oil of peppermint, orange-flower water, oil of cinnamon, oil of lemons, are used to conceal the flavour of disagreeable medicines.

These oils excite a sensation of warmth in the stomach; some of them being used to increase appetite and digestion. In large doses they excite slight inflammation of the stomach and intestines. Many of them, as oil of cloves, oil of cinnamon, oil of anise, oil of fennel, oil of coriander, oil of caraway, oil of peppermint, are employed to prevent the griping pains of purgative medicines.

Some, as cloves and cinnamon, are useful in diarrhœa as adjuncts to astringents. Their stimulant action on the muscular coat of the stomach and intestines removes colic, and expels wind; oil of cajeput especially and oil of cloves are generally preferred in flatulence. Spirit of horseradish, in half-drachm to drachm doses, is highly approved in flatulence. Cajeput oil is said to relieve the pain of dysmenorrhœa.

These oils probably pass readily into the blood, and for the most part act like turpentine. Many of them are employed as antispasmodics, but they are inferior in this respect to chloroform and ether. Whether they undergo any changes in the blood is at present unknown.

Balsam of Tolu, and balsam of Peru, and copaiba, are given in chronic bronchitis with a copious secretion of pus.

Mezereon and sassafras are reputed to be useful in syphilis and chronic rheumatism.

Lavender, rosemary, rue, cinnamon, and some other members of this group, are given as stimulants to nervous and hysterical persons affected with depression of spirits and other symptoms; but they soon lose their effect, unless given in increased doses. Drachm doses of oil of cinnamon given several times daily is strongly recommended in menorrhagia and flooding.

These oils, and the resins derived from them, escape from the body in part with the breath and perspiration, but chiefly with the urine, and in their passage along the urinary tract they stimulate or irritate its mucous membrane. Copaiba sometimes causes bloody urine with strangury and pain in the bladder.

Copaiba, cubebs, and especially buchu, are commonly used in chronic inflammation of the bladder and urethra.

Copaiba and cubebs are used in gonorrhœa and gleet, and cubebs often succeeds when copaiba fails. Copaiba benefits, it is said, the chronic, but aggravates the acute stages of gonorrhœa; while cubebs, which must be given in large doses, is considered only useful at the commencement of attack. Copaiba, however, often promptly relieves an acute attack. Emulsified copaiba has been used, especially for women, as an injection for for gonorrhœa.

Balsam of copaiba in ten to fifteen minim doses sometime acts as a powerful diuretic, and Dr. Wilks, who has used it wit much success, finds that the dieuretic properties reside in th resin. Copiaba has been found very useful in some cases ascites, entirely removing the abdominal dropsy, and in Bright disease. I have in many cases used the resin in ten to fifte grain doses often with great effect; I have seen it answer in cardiac dropsy and in ascites where the kidneys were healthy; also in ascites where there was fatty degeneration of the kidneys; and in Bright's disease, where the kidneys seemed the seat of fibroid change and fatty degeneration, being much contracted, granular, red, firm, the cortex much contracted, with numerous small opaque buff-coloured spots. I have also seen it remove, speedily and entirely, extensive dropsy, due probably to pale fatty kidney. I have also known the resin benefit the chronic disease left by an attack of acute Bright's disease, and prevail over a case of cardiac dropsy, with a small amount of albumen in the urine, and with signs of general decay. Yet in cases which appeared exactly similar I have known it to fail entirely, leading me to think that success or failure depends less on the nature of the disease than on some individual peculiarity. In some cases copaiba causes bloody urine, in others I have seen a large amount of blood in the urine quickly disappear under the influence of copaiba resin.

Copaiba occasionally produces a rash, sometimes like urticaria, sometimes very closely simulating the papules of measles; but there is no fever with copaiba-rash. If the medicine is continued, the papules last many days. The rash does not begin on the face, then spreading downwards over the body, but is patchy, and shows a preference for the neighbourhood of joints. In doubtful cases, where patients deny that they have taken copaiba, it may be detected in the urine by the smell, and with still greater certainty by chemical re-agents; for, if copaiba is present, nitric acid makes the urine turbid, which heat dispels. Copaiba may also be extracted from the urine by shaking it up with ether.

Oil of sandal-wood, in doses of fifteen minims three times a day is useful in acute and chronic gonorrhœa.

Probably most of these ethereal oils escape from the body with the urine; but from Weikart's experiments, quoted by Parkes, this does not appear to be the case with copaiba, the volatile oil being destroyed in the body, and only its resinous acid appearing in the urine.

Many persons highly esteem juniper as a dieuretic in scarlatinal dropsy.

Many of these oils may be prescribed in capsules.

VALERIAN. VALERIANATE OF ZINC. VALERIANATE OF QUINIA. VALERIANATE OF AMMONIA.

Like turpentine and the volatile oils, valerian produces a sensation of warmth in the stomach, a quickened pulse, some mental excitement, and after a large dose, even delirium.

Neligan considers valerian a powerful anthelmintic, and especially recommends it when the worms excite convulsions.

Valerianate of zinc is useful for those numerous, distressing and changeable symptoms, included under hysteria, generally occurring in women at the menopause. Thus it sometimes will remove "flushings of the face," "hot and cold perspirations," restlessness, nervousness, depression of spirits, sensation of suffocation in the throat, throbbing of the temples, fluttering at the heart. In many instances these symptoms depend on uterine derangements, piles, dyspepsia, or constipation; but after the removal of all discoverable disease, or in cases where no cause for the symptoms can be detected, valerianate of zinc is often very beneficial. Oxide of zinc does good, but is certainly inferior to the valerianate. In many instances, however, valerianate of zinc fails in the very cases we should expect it to be useful, our knowledge of the conditions indicating the employment of these medicines being not at present sufficiently precise to enable us to predict in what cases they will be likely to succeed.

Some prefer valerian or its tincture, and ascribe most of its efficacy to the volatile oil, others prefer the salts of valerianic acid.

Valerian has been used with occasional advantage in epilepsy, but whether in true epilepsy, or in merely the hysterical forn[illegible] the disease does not appear.

Valerianate of zinc, or valerianate of ammonia, in twenty-g[illegible] doses, sometimes relieve neuralgia of the face or head. [illegible] I recommended in megrim, in doses of from two to five gr[illegible]ai thrice daily. It is said that valerian preparations will con[illegible]tro the paroxysms of whooping-cough, and the involuntary m[illegible]ove-ments of chorea. Large and increasing doses of valerian[illegible] are stated to be useful in diabetes insipidus.

SAVINE.

Savine is an irritant, and excites inflammation in the tissues. It is sometimes used to keep blistered surfaces open and discharging.

It is employed both in menorrhagia and amenorrhœa due to a want of tone in the uterus. Ignorant people use it to produce abortion.

ASSAFŒTIDA. AMMONIACUM. GALBANUM.

These medicines act very similarly on the body; but assafœtida, probably because it contains most volatile oil, is the most powerful.

Assafœtida has a warm taste; it stimulates the stomach and intestines, and expels wind, and in large doses it often excites nausea and vomiting. It increases the secretion from the mucous membrane of the intestines, and hence acts as a mild purgative. Probably the active principle of these drugs does not pass quickly into the blood; for it makes the eructations offensive for twenty-four hours, or longer.

They generally quicken, but sometimes slacken the pulse.

A full dose of assafœtida induces general exhilaration and sometimes "various nervous or hysterical phenomena, and a general sense of *malaise* (Jorg). It often produces headache and giddiness. It is said to increase the bronchial secretion and perspiration. It does not similarly affect all persons, since

Pidoux took enormous doses without experiencing any inconvenience, except from the offensive smell of his fæces.

Assafœtida is very useful in hysteria, in many cases removing hysterical headache and peculiar sensations in the head. It is also useful in hysterical flatulence.

Assafœtida is useful in the flatulence of young children, unconnected with constipation or diarrhœa. A teaspoonful every hour of a mixture containing a drachm of the tincture to half-a-pint of water is readily taken by children, and is strong enough to speedily relieve distention. When the flatulence is due to constipation or diarrhœa, assafœtida does very little good.

Assafœtida has been recommended in asthma. All members of this group are useful in chronic bronchitis, with much wheezing and abundant discharge, symptoms commonly met with in elderly people; but in cases like these, amoniacum is generally preferred to assafœtida.

CANTHARIDES. *(See Counter-Irritation).*

Preparations of cantharides, taken internally, produce an unpleasant burning taste, and, if in a large quantity, inflammation and vesication of the mouth.

The effect of cantharides in the stomach is in all respects similar to that in the mouth. Even small doses cause smarting in the œsophagus, pharynx, and stomach; but a larger quantity produces inflammation of these parts and of the intestines, with vomiting, and diarrhœa of bloody and slimy stools, much pain and difficulty in swallowing, and often general peritonitis, with which the system sympathises, as indicated by high temperature and quick pulse.

The active principle of cantharides passes from the stomach and intestines into the blood. Its passage, it is true, has not been chemically demonstrated, but the symptoms following the administration of this drug render this conclusion certain; for, after a large dose, all the indications of acute inflammation of the kidneys set in, with much irritation or even inflammation of the urinary and generative organs; and after a poisonous dose, headache, loss of sensibility, convulsions, and death.

The changes cantharidine produces in the blood are at present unknown.

The tincture or powder used to be given in chorea and epilepsy, but this treatment has now fallen into complete disuse.

Little is known concerning the separation of the cantharidine from the body. It is conjectured that, being volatile, some may pass off by the lungs; but, if so, it produces apparently, in its transit through the lungs, no changes in the mucous membrane of the air passages. Owing to the same property some of the cantharidine probably passes off by the skin; and the internal use of preparations of Spanish-fly are recommended by several eminent French dermatologists in psoriasis, eczema, lichen, and prurigo. The chief portion of the active principles of cantharides escapes by the kidneys, and, as we have said, acts as a strong irritant to the urinary and sexual organs.

The preparations of cantharides have been recommended by high authority in certain forms of Bright's disease, but in this disease it has for years past been regarded as a most dangerous drug.

The discrepancy respecting the effects of cantharides arises, perhaps, from the difference in the dose administered by various observers. I am convinced of its usefulness in acute Bright's disease, when the active inflammation and fever have subsided, as they invariably do about the fifth to the eighth day. A chronic state often follows the subsidence of the more acute stage, and the urine continues small in quantity, contains albumen, and perhaps blood. If, just at this time, that is, on the immediate subsidence of the acute inflammation, a one to three-minim dose of tincture of cantharides is given every three hours, the blood will almost always quickly disappear, while the albumen decreases more gradually, and the urine becomes more abundant. At a crisis like this it is true that a like amendment not unfrequently takes place without any treatment; but the influence of the cantharides can often be put to a conclusive test. To a patient in the condition described above, passing urine containing albumen and much blood, give the drug in the way pointed out, and he will begin to improve; now, withhold the medicine and both blood and albumen return in their original quantity, and both may be augmented and lessened again and again by intermitting and reverting to the cantharides; but its restraining influence over the blood is speedier and more deisive than over the albumen of the urine. Sometimes it checks he greater part of the blood but a small quantity remains for ome weeks. This is especially the case when the patient gets up, for even a small amount of exercise often exerts remarkable influence on the renal bleeding. Merely sitting up in bed in some cases notably increases the bleeding.

Cantharides, in a similar dose, has been recommended even in the acute stage of Bright's disease; and when the kidney, having undergone fatty degeneration, secretes very little urine.

After its separation by the kidneys, cantharides acts as an irritant to the urinary tract, and may be employed in cystitis, gonorrhœa, and gleet. A drop of the tincture although five are sometimes required, given three or four times a day, is particularly useful in cases where there is frequent desire to make water, accompanied by great pain in the region of the prostate gland, and along the urethra, while at other times severe twinges of pain are felt in the same part, the urine being healthy or otherwise containing an excess of mucus or even a small amount of pus.

Women, especially middle-aged women, often suffer from frequent desire to pass water, or inability to hold it long, sometimes only in the day on moving about. Micturition causes no pain, neither is there any straining, and the urine is natural. Other women cannot help passing a little urine on straining, or sneezing, or coughing. Sometimes women are troubled with both sets of symptoms, which appear due to weakness of the sphincter of the bladder. One or two drops of tincture of cantharides three or four times a day, will in many cases afford great relief and sometimes cure with astonishing rapidity, even when the symptoms have lasted months or years.

Tincture of cantharides is useful in the incontinence of urine of the aged, even when due to paralysis, and sometimes in that of children. With children, however, it is inferior to belladonna. Unfortunately, each remedy fails in a not inconsiderable number of cases.

A drop of the tincture, three times a day, in the majority of cases, will abate or remove chordee.

Cantharides affects the generative organs. Large quantities of the drug congest and inflame these parts, and often produce erection of the penis, effects generally attributed to the sympathy existing between the genitary and urinary tracts. It certainly excites the sexual appetite, and has been often given criminally for this purpose. Full doses of cantharides, twenty to thirty drops of the tincture, or half a grain of the powder with full doses of sesqui-chloride of iron and phosphoric acid, or nux vomica three times daily, is a combination effective in some cases of impotence; in the impotence of old age, and in that resulting from self-abuse or sexual excess, it has proved successful and the patient has begotten children. Cantharides and iron combined are useful in some cases of seminal emissions.

Cantharides has been sometimes successfully employed to produce abortion; but the danger is so great as to deter any medical man from using this drug.

MUSTARD.

Mustard is in common household use as a poultice, a counter-irritant, and an excitant. Much that has been said of blisters applies to mustard poultices. (See Counter-irritation). As has been elsewhere stated, cantharides need seldom be applied to produce much vesication, and with regard to mustard, vesication should be carefully avoided, as the sore so produced is intractable, heals slowly, and pains greatly. Although mustard may be used in all cases where we should employ cantharides, short of vesication, still there are differences in their action. A mustard poultice is more painful than a blister, producing a severe burning, soon becoming unendurable, and if not speedily removed, creating troublesome vesication. A mustard poultice can rarely be borne longer than twenty minutes or half an hour; if the skin is delicate, as in children and many women, it cannot be endured for so long. Owing to the pain produced and to its prompter action, a mustard poultice is more effective than a blister when applied to rouse a drowsy and comatose patient from poisoning by opium or alcohol, or in certain conditions occurring in the course of fevers. (See Counter-irritation).

When a mustard poultice is employed to affect deep-seated diseased organs, as in bronchitis, pleurisy, or pneumonia, its action should be sustained for a long time, over a considerable extent; the larger the tract of skin attacked, the greater is its influence on the organs beneath. Small mustard poultices are less useful, except to remove a localized pain. The poultice diluted with bread or oatmeal, should be of a size sufficient to cover the front or back of the chest, or both, and should be continued for five, six, or more hours. There is a prevalent idea, perhaps a true one, that the action of cantharides is more searching and affects the deeper parts more thoroughly.

In bronchitis the whole chest of a child should be enveloped in a jacket-poultice, which may be retained in its place by the following contrivance:—the poultice is spread on a piece of linen, sufficiently large for the purpose, to which tapes are tacked; the tapes may be tied over each shoulder, and at three places in front of the chest. The poultice must be made with tepid water, boiling water evaporates the active principle, vinegar destroys it, and alcohol prevents its formation. On removing the poultice, the skin should be sponged with warm water, or, if the smarting is severe, with ether, and then the application of a layer of cotton-wool, although for the first few minutes it aggravates the pain, soon subdues it altogether.

A general mustard bath, when appropriately used, often does great good. Although almost exclusively used for children, it is just as serviceable for adults. It may be employed on the recession of the rash of any of the eruptive fevers, to bring it back to the skin. Again, in severe general bronchitis of children, this form of bath is of great service as a counter-irritant. A table-spoonful of mustard should be added to a bath sufficiently large for the child, who should be held in it by the nurse till her arms tingle and smart.

In cases of arrested catamenia, a mustard sitz bath may be used to redden and irritate the skin of the buttocks and thighs, a few days before and during the time of the missing discharge is due. A course of mustard baths assists considerably the restoration of the uterine functions.

Added to a hot foot-bath, mustard is used to relieve headache, congestion of the head, and inflammations of the internal organs. A mustard poultice, or the more convenient mustard leaf, covered with one, two, or three folds of mustard, according to the susceptibility of the patient to the action of the poultice, applied to the nape of the neck, is often serviceable in various forms of headache.

It excites in the stomach a sensation of warmth and slight pain, which may be mistaken for hunger, giving rise to the notion that mustard sharpens the appetite and promotes digestion; but it has been proved that mustard does not increase the secretion of gastric juice.

It is strange that a substance which acts so powerfully on the skin should affect so slightly the mucous membrane of the stomach; considerable quantities may be swallowed without other effect than the production of nausea and sickness. The mild action of mustard on the mucous membrane cannot be explained by its expulsion by vomiting; for even when retained, it excites only a little catarrh of the stomach. Mustard is used as an emetic when no other is at hand, and when no time is to be lost. Cases of obstinate and even dangerous hiccup are reported which have been immediately cured by drinking an infusion made with a tea-spoonful of mustard steeped in four ounces of boiling water for twenty minutes and then strained.

Mustard appears to have very little action on the intestines beyond making the motions moister.

Some of the active principle passes into the blood, but it is unknown what influence sinapine exerts on the organs to which it is conveyed. It is reputed to be diuretic, but this is doubtful; moreover, its advocates fail to discriminate the cases in which it is supposed to be beneficial.

It is said to be useful in whooping-cough.

CAPSICUM.

Capsicum irritates and inflames the skin, producing redness, a sensation of warmth or burning, and even vesication, but its preparations are rarely employed as rubefacients. The tincture is sometimes lightly painted over unbroken chilblains, but it is inferior to the ointment or the tincture of iodine. The following capsicum preparation of De Rheims is highly lauded for chilblains:—

" Make a strong tincture of capsicum pods by steeping them for several days in a warm place, in twice their weight of rectified spirits of wine. Dissolve gum-arabic in water to about the consistency of treacle. Add to this an equal quantity of the tincture, stirring it together with a small brush or a large camel's

il until they are well incorporated. The mixture will
r and opaque. Take sheets of silk or tissue-paper, give
h the brush a coat of the mixture; let them dry, and
another. Let that dry, and if the surface is shining,
enough of the peppered gum; if not, give a third coat.
er applied in the same way as court-plaster to chilblains
not broken, and burns that are not blistered, speedily
he itching and the pain. It acts like a charm, and
rapid cure. The same with discoloured bruises. It
allays rheumatic pains in the joints."

end, Mr. Henry Buck of Newport, Essex, employs cap-
recent lumbago, neuralgia, toothache, rheumatic pains
e torticollis. He infuses a large handful of crushed cap-
ds in a pint of hot or cold water for thirty-six hours;
s a piece of lint soaked in this liquid, to the affected
ering it with thin gutta-percha. It never vesicates, and
stronger preparation may be used. The effects, he
often very striking; for instance, he cures acute torti-
ten minutes. A quack doctor in the west of England,
his secret to Mr. Buck, had long and successfully em-
his preparation.

rations of capsicum have a burning, tingling taste, and
e mucous membrane as on the skin. The tincture as
, in the proportion of a drachm to half-a-pint of water, is
some sore throats, and may be applied under the same
ns which indicate the use of nitrate of silver. Thus, in
early stage of tonsillitis or pharyngitis, either of these
es, which acts as an irritant, will check the inflamma-
ut when the deep parts become involved, and the tissues
vollen, irritants of any kind do great harm. In malig-
e throat, capsicum gargle may be used with advantage
late the tissues into a healthier condition, and here
action is similar to that of nitrate of silver. In relaxed
when the mucous membrane is bathed with a grey
r with pus, the same gargle may be employed, although
bably not superior to the glycerine of tannic acid.

ts as an irritant in the stomach, and in large quantities
luce gastro-enteritis. It is often used as a condiment
digestion, but whether it is effective in this respect is
nined. The stomach becomes accustomed to capsicum,
ast large quantities must be eaten to produce any effect.

I can endorse Dr. Lyon's strong recommendation of capsicum in dipsomania. Ten-minim doses of the tincture obviate the morning vomiting, remove the sinking at the pit of the stomach, the intense craving for stimulants, and promote appetite and digestion. It should be taken shortly before meals, or whenever there is depression and craving for alcohol. Capsicum also induces sleep, especially in the early stages of delirium tremens. Dr. Lyon sometimes gives twenty or even thirty grains made into a bolus with honey, and repeats the dose in three hours if the first fails to induce sleep. He says this quantity does not disturb the stomach.

Capsicum is often useful to dipsomaniacs to enable them to overcome their pernicious habit. By removing the sinking at the pit of the stomach, it often enables the drunkard to resist the drink-crave. A draught composed of ten minims of tincture of capsicum, ten grains of bromide of potassium, a drachm of spirits of ammonia, taken several times daily is very serviceable; or the bromide of potassium may be omitted and replaced with two minims of liquor arsenicalis, or by a few drops of tincture of nux vomica or tincture of orange peel.

Capsicum is very useful in summer diarrhœas, and in diarrhœas persisting after the expulsion of the exciting irritant. *It* is used in flatulence.

IPECACUANHA AND ITS PREPARATIONS.

When applied to the skin, ipecacuanha after some time produces a sensation of warmth, attended with redness, and the formation of papules; sometimes it even produces pustules, which on healing are not followed by pitting or scarring.

It has a disagreeable bitter taste, and excites the flow of saliva.

In some persons the minutest quantity produces peculiar effects on the membrane covering the eyes and lining the nose and respiratory tract. On smelling the drug, or even entering a room where it is kept, they are affected with swelling of the loose tissues around the eyes, with injection of the conjunctiva, repeated sneezing, abundant discharge from the nose, severe tensive frontal pain of the head, much oppression at the chest, with frequent cough, and the signs and symptoms of bronchitis. Ipecacuanha thus excites symptoms and appearances similar to those occurring in hay fever; that is, it excites a certain catarrhal inflammation in the mucous membranes. It is highly probably that ipecacuanha produces similar results in all persons, and that its action on individuals differs only in degree. Indeed, it is probable, as we shall see, that ipecacuanha affects all the mucous membranes.

Small doses produce in the stomach a slight sensation of uneasiness, with increase of mucus, whilst larger doses excite nausea and a still greater secretion of mucus from the stomach and from the bronchial tubes. Increase of mucus, indeed, occurs with all nauseating medicines, but probably ipecacuanha excites the secretion of mucous independently of its action as a nauseant and emetic. In animals large doses are stated to produce inflammation of the mucous membranes of the stomach, intestines, and bronchial tubes.

Ipecacuanha is frequently used in catarrh of either the stomach or lungs. It is especially useful when the secretion from the lungs is abundant and tenacious.

In larger doses it produces both nausea and vomiting, and like all other emetics, some general weakness, with sweating: and if there is any spasm, relaxation of it. Thus in nauseating doses, the drug is both diaphoretic and anti-spasmodic.

It is a mild, tardy, but certain emetic. It produces repeated vomiting, unaccompanied by much nausea or prostration; in these respects, and also in its slighter action on the bowels, it differs from tartar emetic. Its tardy action renders it an unfit emetic in cases of poisoning when the sulphates of zinc or copper are to be preferred.

M. Chouppe who has investigated the action of emetics, finds that after section of the pneumogastric nerve, the injection of apomorphia or tartar emetic into a vein excites vomiting as quickly and abundantly as when the nerve is uncut, whilst emetin does not excite vomiting. As regards emetin Dr. Dyce Duckworth's experiments with emetin, lead him to a similar conclusion. M. Chouppe concludes that apomorphia and tartar emetic act directly on the vomiting-centre, and that emetin acts through the termination of the pneumogastric nerve.

On account of its slight irritant action on the mucous membrane of the stomach, and perhaps by virtue of the strong movements it produces in that organ when it excites vomiting, ipecacuanha is found useful in irritative dyspepsia, both of t[illegible] acute and chronic kind. With some practical authorities, it is a favourite plan to give occasionally in such cases ipecacuanha in emetic doses. It is sometimes given to produce vomiting in the bronchitis of children, where the patients breathe with difficulty from the presence of mucus in the bronchial tubes. The movements of vomiting expel much mucus mechanically, and temporarily improve the breathing. From its mildness ipecacuanha is fitted for such cases, and as an emetic for delicate persons.

The quantity required to excite vomiting varies greatly, the smallest quantity being sufficient for some, while with others large doses are inoperative. As a rule, children require large doses, and babies only a few months old may need ten or twenty grains of the powder.

Few remedies are so efficacious as ipecacuanha in checking certain kinds of vomiting. In numerous instances I have witnessed the efficacy of drop doses of the wine administered every hour or three times a day, according to the urgency of the case, in checking the following kinds of sickness :—

1. It will check the vomiting of pregnancy. This vomiting is not always of the same kind. In some cases it occurs only in the morning and is excited by the first waking movements. This form will in most instances yield to ipecacuanha, taken in the way described; but should it fail the administration of the medicine to the patient on waking, and some time before any movement is allowed, will generally give relief. In other instances the vomiting occurs not only in the morning, but frequently during the day, recurring whenever food is taken, and may be so severe that the stomach rejects all nourishment, while during the intervals of meals there may be constant nausea and great loathing of all kinds of food. Vomiting and nausea of this kind will, in most instances, be immediately arrested by ipecacuanha, when the appetite will return, and the stomach will bear almost any kind of food. Ipecacuanha may check the nausea and vomiting, with the exception of the early morning attack, but on taking a dose immediately on waking, this early sickness too, will generally cease, though in some cases it defies treatment.

In other instances the early morning vomiting may be absent and the attack may occur only on taking food, increasing in ty as the day advances, and becoming most severe in the ıg. Should ipecacuanha as is sometimes the case, fail to this form of sickness, nux vomica will generally give

some pregnancies, besides the sickness and nausea, there ıch heart-burn, and perhaps great flatulence, symptoms in many cases yield quickly to ipecacuanha; but here , should this remedy fail, nux vomica will generally afford though the symptoms yield more surely to both remedies. singular that while ipecacuanha will remove, in pregnant ıts, excessive flatulence, co-existing with sickness, yet if ıtulence occurs without sickness, this medicine is generally iling, and recourse must be had to nux vomica, charcoal, ırous acid, or sulpho-carbolate of soda; and of all these most reliance is to be placed on the sulpho-carbolate, in of five to fifteen grains dissolved in water, and adminis- immediately after a meal.

has been stated that, in some instances, nux vomica suc- when ipecacuanha fails; and this is notably the case when ngue is coated with a creamy fur, when the stomach is out ler, and when there is .much acidity and heartburn. In cases, both nux vomica and ipecacuanha may be given ;aneously.

nust be confessed, however, that in certain instances, at pre- nexplained, ipecacuanha fails to afford the expected relief. :h cases vomiting is possibly kept up by a displacement of erus, or by a chronic inflammation of this organ, or of its , or os, as was long since pointed out by Dr. Henry ıtt, when of course the treatment should be directed to the al of these conditions.

Some women, who, during pregnancy, are untroubled with a and vomiting, yet suffer with both these symptoms dur- e whole or part of the time of suckling. These symptoms y begin after the first few weeks of suckling, and continue e child is weaned, and may be so severe, and produce so exhaustion, as to compel the mother to wean her child ıturely. Great flatulence may accompany the nausea and ing. Drop doses of ipecacuanha wine, administered three a day, will commonly soon cure these symptoms.

Similar troubles to those just pointed out afflict some n at each menstrual epoch, occurring immediately before, during, or directly after the period. These cases, too, will generally yield to ipecacuanha.

4. The morning vomiting of drunkards; but this morbid state is more effectively controlled by arsenic.

5. The morning vomiting which sometimes accompanies general weakness, and is met with in convalescents from acute diseases.

6. Ipecacuanha will at once control the vomiting in children, with acute catarrh of the stomach. Indeed, this remedy appears to exercise greater influence over the vomiting of children than over that of adults.

Arsenic succeeds admirably, likewise, in removing the vomiting of acute stomach catarrh; and either remedy may advantageously be given with aconite, to subdue the inflammation, and reduce the fever.

7. In whooping-cough, ipecacuanha often removes or lessens the vomiting when this is occasioned by the violence of the cough, although its severity may in no degree be lessened. Cases of vomiting from this cause occur, which are unaffected by ipecacuanha, but which yield immediately to alum. (See Alum).

8. A species of vomiting occurs after meals, without nausea or pain, or even discomfort, the food being merely rejected, partially, or often very little digested. This condition may persist a considerable time, but ipecacuanha wine, in many instances, quickly cures it. Arsenic, however, is a still better remedy.

Ipecacuanha, in my experience, proves of little use in the following forms of vomiting :—

(*a.*) In children, where the vomited matters are composed of large hard lumps of curdled milk. In such a case, when diarrhœa is present, lime-water mixed with the milk is the best remedy, but if the child is constipated, bicarbonate of soda should be substituted for the lime-water; and, should these remedies both fail, milk must be altogether excluded from the diet.

(*b.*) Ipecacuanha is not generally useful in that form of vomiting met with in young children, a few weeks or months old, who, almost immediately after the ingestion of milk, reject it with considerable force, either curdled or not, perhaps through both nose and mouth. At the *post-mortem* examination nothing may be discovered to explain this fatal form of vomiting; but sometimes the mucous membrane of the stomach is extremely soft, and looks as if made of water arrowroot. This form of vomiting is best treated by hourly small doses (one-third of a grain) of grey powder, or by calomel (one-tenth of a grain).

(*c*.) In hysterical vomiting.

Ipecacuanha is sometimes effective in checking the vomiting from cancer of the stomach, and has succeeded sometimes after the more commonly used remedies have entirely failed.

I have several times met with cases where the symptoms may be compared to rumination. The food quite tasteless, has simply regurgitated into the mouth, without any effort at vomiting. These patients often chew the food a second time and swallow it without distaste. There may be no other symptoms, though, so far as I have seen, this regurgitation occurs generally when the health is disordered. I have seen ipecacuanha or arsenic promptly remove this regurgitation, though it may have continued with intermissions for months or years.

Ipecacuanha excites an increased production of mucus in the mucous coat of the intestines, and becomes in this way slightly purgative, and is reputed to assist the action of other purgative medicines, as jalap. It is also stated, that a grain of powdered ipecacuanha each morning while fasting, will relieve constipation, depending on great torpor of the intestines. The same treatment, it is said, will remove the dyspepsia frequently associated with constipation, and characterized by depression of spirits, some flatulence, coldness of the extremities, and by the food lying on the stomach "like a heavy weight."

It is well known that this drug is largely and beneficially employed in dysentery. In some epidemics it answers admirably, while in others it appears to fail. Large doses are required, and will often succeed where small ones fail. Sixty to ninety grains of the powder are given at a dose, and repeated if required, oftentimes without the production of either nausea or sickness; but these symptoms, should they arise, may generally be obviated, if the patient, after taking the drug, will remain quietly on his back. In chronic cases not requiring prompt treatment, it is a good practice to administer the first dose at night when the patient has gone to bed. Should the few first doses excite sickness, it soon passes away on persevering with the medicine.

E. S. Docker, who has had a very large experience of this treatment, extols ipecacuanha. He states that its effects in suitable cases are almost instantaneous, the motions in the very worst cases becoming natural in frequency and character. Ninety grains of the powder cut short at once very severe attacks of dysentery, not only restraining the discharge off-hand, but freeing the patient from pain immediately, while inducing natural stools without straining or griping. The disposition to relapse, so common in acute dysentery, is not observed after the ipecacuanha treatment; and there is no need for after treatment, nor for any great precautions concerning the quality of the food. After a large dose, as sixty or ninety grains, Docker recommends an interval of ten or twelve hours before repeating it, and should the bowels meanwhile remain quiet, to forego the medicine altogether. It is recommended to inject ipecacuanha especially when it is rejected by the stomach.

The dysenteric diarrhœa of children, whether acute or chronic, will generally yield speedily to hourly drop doses of ipecacuanha wine. The especial indications for this treatment are slimy stools, green or not, with or without blood. Vomiting, if present, as is commonly the case, affords an additional reason for the adoption of this treatment. After the first or second dose of the medicine, and generally before the diarrhœa is checked the sickness will often cease. Sometimes it happens that although the ipecacuanha abates the number and the dysenteric character of the evacuations yet supplementary treatment may be required.

The active principle of ipecacuanha, without doubt, enters the blood, and we have next to consider its action on the distant organs of the body.

It produces an increased secretion from the bronchial mucous membrane. Some maintain that this occurs only when ipecacuanha excites nausea, and that the action of the drug is solely due to the production of this physiological state, for it is well known that during nausea an increased secretion takes place from most of the surfaces of the body including the respiratory mucous tract. Others consider that it can affect this mucous membrane irrespective of the production of any sensation of sickness; and that this is the correct view, is borne out by the powerful effect of even a minute quantity of this medicine on the bronchial tract of some persons, though the same dose may fail to produce sickness or even nausea.

Ipecacuanha in the form of wine, is of almost constant use in bronchitis, when the expectoration is profuse, and difficult to expel.

The successful use of a secret remedy by a well known practitioner induced me in conjunction with Mr. William Murrell, to try the effect of inhalations of ipecacuanha spray in those obstinate complaints, Winter Cough, and Bronchial Asthma. Our observations were made during January and February and whilst undergoing this treatment, the patients took only coloured water and continued their usual mode of living in all respects. First, regarding winter cough, we made observations on twenty-five patients, whose ages varied between 45 and 72, with one exception, that of a woman of 32 years, and we purposely selected severe cases. The following general description of a typical case will serve in most points to illustrate the condition of them all: The patient had been troubled with winter cough perhaps for many years. During the summer he is pretty well; but during the cold months, from October to May, he suffers sometimes without any intermission, occasionally getting a little better and then catching cold; or perhaps he may lose his cough for a few weeks but again takes cold on the slightest exposure. So short is the breathing that he can walk only a few yards, especially in the cold air, and finds it very hard work to get upstairs, and is often quite unfitted for active life. The breathing grows worse at night, so that he cannot sleep unless with the head propped up with several pillows. He is troubled, too, with a paroxysmal dyspnœa usually at night, which may last several hours and constrains him to sit up. Sometimes the breathing is difficult only on exertion, and in most cases fogs, east winds or damp make it much worse. The expectoration generally difficult to expel, varies greatly. In a few cases there is very little; usually, however, it is rather abundant, often with little or no rhonchus. The cough is very violent, frequent, hacking and paroxysmal, and the fits may last ten to twenty minutes and even excite vomiting. They are generally brought on by exertion; nay, in bad cases, so easily are they provoked, that the patient is afraid to move or even to speak. The cough and expectoration are much worse in the morning on waking. Sometimes the cough is slight and the expectoration is generally scanty; the distressed breathing being the chief symptom. The patient generally wheezes loudly, especially at night. In a bad case the legs swell. The patient is emphysematous; there is often no rhonchus, or only sonorous and sibilant or a little bubbling rhonchus at both bases.

In this common but obstinate complaint our results have been very striking, although so bad was the breathing in many of our patients, that on being shown into the out-patients' room, they dropped into a chair, and for a minute or so were unable to speak except in monosyllables, having no breath for a sentence. We used the ordinary spray producer with ipecacuanha wine, pure or variously diluted. At first it sometimes excites a paroxysm of coughing which generally soon subsides; but should it continue, a weaker solution should be used. The patient soon becomes accustomed to it, and inhales the spray freely into the lungs. At first a patient often inhales less adroitly than he learns to do afterwards, as he is apt to arch his tongue so that it touches the soft palate, and consequently less spray enters the chest than when the tongue is depressed. The spray may produce dryness or roughness of the throat, with a raw sore sensation beneath the sternum; and sometimes it causes hoarseness, whilst, on the contrary, some hoarse patients recover their voice with the first inhalation. As they go on with the inhalation they feel it getting lower and lower into the chest, till many say they can feel it as low as the ensiform cartillage.

The dyspnœa is the first symptom relieved. The first night after the spraying the paroxysmal dyspnœa often improved, and the patient had a fair night's rest, although for months before shortness of breath and coughing had much broken the sleep. The difficulty of breathing on exertion also quickly abates, for often after even the first adminstration the patient walked home from the hospital much easier than he came to it; and this improvement is continuous, so that in one or two days, or a week, the patient can walk with very little distress; a marked improvement takes place immediately after each inhalation, and although after some hours the breathing may again grow a little worse, some permanent improvement is gained unless the patient catches a fresh cold. I have heard patients say that in a week's time they could walk two miles with less respiratory distress than they could walk a hundred yards before the use of the spray. In some instances two or three days daily spraying elapse before any noticeable improvement takes place, this comparatively slow effect being sometimes due to awkward inhalation, so that but little ipecacuanha passes into their bronchial tubes. The effect on the cough and expectoration is also very marked, these both greatly decreasing in a few days, though the improvement in these respects is rather slower than in the case of the breathing; sometimes for the first few days the expectoration is even rather increased; it speedily alters in character so that it is expelled much more readily, and thus the cough becomes easier, even before the expectoration diminishes. The patient is soon enabled to lie down at night with his head lower, and in a week or ten days, and sometimes earlier, can do with only one pillow, an improvement which occurs in spite of fogs, damp, or east winds, nay, even whilst the weather gets daily worse, and when the patient is exposed to it the chief part of the day. These patients all came daily to the hospital. Of course it would be much better to keep a patient in a warm room.

Of the twenty-five cases all were benefited except one. In one case the improvement was very gradual, but each inhalation produced evident temporary improvement. In twenty-one cases, the average number of inhalations required was 9·4, and the average number of days was twelve, before the patients were discharged cured. The greatest number of inhalations in one case was eighteen, and the smallest three. The case longest under treatment required twenty-four days, the shortest four.

In order to insure as far as possible only the topical effects of the ipecacuanha spray, we were careful to direct the patient to spit out, and even to rinse out the mouth at each pause in the administration, for far more wine collects in the mouth than passes into the lungs. If this precaution is not adopted, sometimes enough is swallowed to excite nausea and even vomiting, by which means the bronchial mucus is mechanically expelled, and of course in this way effects temporary improvement. Even when this precaution is observed, a protracted inhalation will excite nausea and sometimes vomiting by the absorption of the wine by the bronchial mucous membrane; though strange to say vomiting when thus induced, was long delayed, even for several hours, nay, sometimes till the evening, though the inhalation was used in the morning. In our cases, however, the improvement was not due to the nauseating effects of the spray, for we took care to avoid this contingency, by administering a quantity inadequate to produce this result. The duration of each inhalation will depend on the amount of spray produced by each compression of the elastic ball, or on the susceptibility of the patient to the action of ipecacuanha. As a rule, the patient at first will bear about twenty squeezes of the spray without nausea, and will soon bear much more. After two or three squeezes, especially on the commencing treatment, we must pause awhile. It is necessary to look at the patients tongue, and tell him to learn to depress it; for if the tongue is much arched, it will hinder the passage of the spray to the lungs. It is a good plan to tell the patient to close his nose with his fingers, and to breathe deeply. The inhalation should be used at first daily, and in bad cases twice or thrice in the day, afterwards every other day suffices, and the interval may be gradually extended. If the ipecacuanha wine is diluted, then the spray must be used a longer time. In cold weather the wine should be warmed.

We have tried the spray with very satisfactory results in a few cases of a more severe, though closely allied, disease, which may be thus summarized:—A patient has suffered for several years from severe "winter cough," with much dyspnœa, cough, and expectoration, and on several occasions has spat up a considerable quantity of blood. The physical signs denote slight fibroid consolidation with excavation of both apices with much emphysema, perhaps atrophous in kind. There is little or no rhonchus, and no fever. The expectoration may be slight or very abundant, muco-purulent or purulent. The dyspnœa is perhaps so very severe, and is so paroxysmal, as to justify calling the case bronchial asthma with emphysema and fibroid phthisis.

In this class of cases the ipecacuanha spray is almost as beneficial as in those just previously described. The spray soon controls the dyspnœa, thus enabling the patient to sleep, greatly lessens expectoration and cough, and by these means really improves the general health. As in the previous cases the first inhalation may considerably improve the breathing, though the effects are not permanent, the dyspnœa returning in the evening, so that spraying is needed night and morning and may be required for weeks or months, the ipecacuanha appearing rather to mitigate than to permanently cure the dyspnœa.

We have used this spray in cases of true and severe bronchial asthma, with very opposite results. In one severe case accompanied by a great deal of bronchitis it gave very great relief. The other patient, not so ill, had been all his life asthmatic, and on catching even a slight cold, his breathing became greatly oppressed. In this instance each application of the spray considerably aggravated the dyspnœa even when the wine was diluted with an equal quantity of water. Possibly a still weaker solution might have been borne, but we are inclined to think that in this case any quantity of ipecacuanha would have disagreed, as the tightness of breathing increased almost immediately on commencing the inhalation. The successful case was a very severe one. For years this woman had suffered from bronchitic asthma, and when she applied to the Hospital was unable to lie down, owing to violent paroxysmal dyspnœa. The worst attack began about 3 A.M. compelling her to start out of bed and struggle for breath. She was very emphysematous, the expiration enormously prolonged. She was very hoarse. The first inhalation removed the hoarseness in a few minutes, and much improved her breathing which continued freer till midnight, when the dyspnœa returned. The cough became easier and she expectorated more freely. Each inhalation always gave her very great and marked relief. She walked to the Hospital with great difficulty being constrained to stop frequently. On entering the room she could not speak but laboured violently, and with loud wheezing, to get her breath. A few inhalations would gradually set the breathing free, so that air entered more and more freely, with gradual diminution of the wheezing, till by the completion of the inhalation, she could breathe without difficulty. As the breathing improved she could feel the spray descending lower and lower in her chest. At first it would seem to reach only the back of the tongue, then the top of the sternum, then descend to mid-sternum, and at last she felt as if it reached as low as the pit of the stomach. This improvement was maintained through the day, but at evening a relapse would occur, yet her nights though at first bad, were still decidedly better than before the treatment. Soon, however, the effects became more lasting and she slept well. On discontinuing the spray, however, the breathing again grew worse, and she was obliged to revert to the treatment, but unfortunately she so easily caught cold, and so bad was the weather that she was obliged to stay away for days together. Whilst her breathing improved, the cough and expectoration mended, but these two symptoms continued rather troublesome. So marked was the benefit from the spray that the patient and her friends expressed their astonishment especially at the prompt relief it gave.

We have tried it in several additional cases of genuine asthma but with unsatisfactory results; for in most cases it has considerably tightened the breathing to such an extent that patients have refused to give it a second or third trial.

We have continued to carry on our observations with ipecacuanha wine spray, and with results confirmatory of the statements made in the *Brit. Med. Journal*. We find, however, that some patients are very intolerant of ipecacuanha spray, which in them causes a good deal of irritation, and even tightness of breathing. It is advisable, therefore, at first to dilute the wine with one or two parts of water: a precaution especially needful for patients affected with much dyspnœa, with lividity; for the spray may for some hours much intensify the difficulty of breathing and lividity, so as to alarm the patient and friends.

It may be not much out of place to mention here that, in several instances, we have found the spray very serviceable in non-febrile inflammatory sore-throats, the mucous membrane being swollen and very red. We have found it useful, too, in hoarseness from congestion of the vocal cords. Where the hoarseness has lasted a few days only, or one or two weeks, the spray often speedily cures; but, where the hoarseness has persisted three months or longer, the spray improves the voice considerably, but leaves some hoarseness.

Dr. Hyde Salter strongly recommends ipecacuanha in hay asthma, and in other forms of asthma, employing it to cut short a paroxysm of dyspnœa. He considers that in common with tobacco and antimony, it controls by virtue of its action as a depressant. He prefers it to the other two remedies just named, and gives it in doses large enough to cause depression but too small to excite vomiting. Like other depressants it must be given at the very beginning of the attack of dyspnœa, for the influence of the remedy is considerably less over a fully developed attack. He prefers the powder to the wine, and seldom gives less than twenty grains. This treatment, directed only against each attack of dyspnœa, leaves the complaint in other respects untouched, and more permanent relief must be sought in an appropriate diet, and a climate suited to the patient.

Dr Hyde Salter has drawn particular attention to the influence of diet on pure asthma. As persons prone to asthma suffer from tightness of the breath for some hours after a meal, and the smallest quantity of food greatly aggravates an attack of asthma, therefore the meals must be small, and digestible. Asthmatic attacks occur commonly at night, seeming to be favoured by sleep, keeping awake often wards off an attack. The attacks are especially liable to occur after a late meal, therefore an asthmatic should take a light tea, and go without supper; in fact, should take no full meal after two o'clock. Breakfast should be the chief meal. Asthmatics must rise early, to avoid a too prolonged fast. Their food must be plain, well-cooked, and nutritious. Milk and eggs form a good diet. Cocoa is better than tea, but milk is better than either. Mutton is preferable to beef or lamb, while pork and veal must be prohibited; new boiled potatoes or succulent vegetables may be permitted. Fish is suitable. Cheese, dessert, preserved meats or fruits, must not be eaten, and stimulants of any kind are generally bad. Heavy malt liquors, especially those containing much carbonic acid, are the worst beverages. The quantity of food should not be large, although food does not produce the paroxysm by its bulk, as the attack generally occurs some hours after a meal, when the stomach is becoming empty. Most asthmatics may eat what they like at breakfast. Dr. Pridham, who has had great success in the treatment of asthma, and who long ago pointed out the importance of a regulated diet, orders the following regimen:—Breakfast, at eight, half a pint of green tea or coffee, with a little cream, and two ounces of dry stale bread. Dinner, at one, two ounces of fresh beef or mutton, without fat or skin, two ounces of stale dry bread or well-boiled rice. Three hours after dinner, half a pint of weak brandy and water, or toast and water *ad libitum*. Supper, at seven, two ounces of meat and two ounces of dry bread. He prohibits drinking for an hour before dinner or supper, and till three hours after meals. When digestion has improved, he allows three ounces of meat twice a day. Dr. Salter gives the following excellent remarks on the climates suitable for asthmatics.

(*a*.) Residence in one locality will radically and permanently cure asthma resisting all treatment in another locality.

(*b*.) The localities most beneficial to the largest number of cases are large, populous, and smoky cities.

(*c*.) That this effect of locality depends probably on the air.

(*d*.) That the air which would be imagined to be the worst for the general health is, as a rule, the best for asthma; thus the worst parts of cities are the best, and conversely.

(*e*.) This is not always the case, the very reverse being sometimes so.

(*f*.) That there is no end to the apparent caprice of asthma in this respect.

(*l*.) That possibly there is no case of asthma that might not be cured if the right air could be found.

(*m*.) That the disposition is not eradicated, but merely suspended.

Ipecacuanha will in many cases of whooping cough, often lessen the severity and frequency of the paroxysms; and will frequently arrest the vomiting they produce. Dr. Phillips, and some other observers, consider ipecacuanha especially useful when the attacks of coughing are accompanied by retching and vomiting. Like other whooping-cough remedies, it often fails in cases apparently in all respects similar to those it benefits, and in certain epidemics it appears to be all but useless.

It is also supposed to be a diaphoretic. Of course it excites sweating when it excites nausea; but even irrespective of this condition it may perhaps be a diaphoretic.

It has been highly praised for its efficacy in hæmorrhages, as in epistaxis,* bleeding from the lungs or womb, and the flooding after delivery. Some of its advocates give even drachm doses of the powder.

In flooding after delivery, Higginbotham recommends ipecacuanha, in quantity sufficient to produce vomiting, and to this effect he ascribes its great efficacy in arresting hæmorrhage. In his hands, this treatment succeeded in the most desperate flooding cases; but it may well be doubted, whether beyond its emetic effect ipecacuanha exerts any influence over uterine hæmorrhage. Zinc would probably answer equally well. Dr. George Bird tells me that he once witnessed, in the case of a Syrian Jewess, the prompt suppression of flooding by her attendant, who crammed down the patient's throat a handful of her hair. Probably the mechanical excitation of vomiting would prove useful in flooding.

Trousseau recommended ipecacuanha to be taken for some days immediately after childbirth as a useful means to promote the natural functions peculiar to that time.

Ipecacuanha acts more surely as an emetic when given in divided doses at short intervals; as five grains in a little warm water every five or ten minutes.

VERATRUM VIRIDE.
VERATRUM ALBUM.
VERATRIA. (Sabadilla).

VERATRUM viride contains two alkaloids viridia and veratroidia, and these differ both physiologically and chemically from veratria derived from sabadilla seeds. Veratroidia is placed physiologically between viridia and veratria.

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* Dr. Martin of Geneva, arrests epistaxis (the blood generally coming from one nostril) by compressing the facial artery of the side upon the upper jaw, near the nose, thus lessening the supply of blood to the nose Is it possible to arrest flooding by compressing the aorta, in the manner adopted by Dr. Murray in aneurism?

Viridia causes great muscular weakness, slow pulse, greatly lowered arterial pressure, muscular thrills, convulsions, diminution, and at last loss of reflex action (in frogs), but produces no purging, nor vomiting, nor sneezing when snuffed into the nose.

Viridia acts directly on either the muscular substance or the ganglia of the heart; for (1) it affects the heart when the pneumogastric is divided, (2) and when it is directly applied to the heart's substance.

The considerable diminution of arterial pressure is partly due to the effect of the drug on the heart, but it is supposed also to paralyse the vaso-motor centres.

Diminution of reflex action is not due to the influence of viridia on the muscles or nerves,and must therefore be due to depression of the reflex function of the cord.

Veratroidia, more irritating than viridia, causes sneezing, vomiting, diarrhœa, thrills, and convulsions. Like viridia it is a spinal depressant, It affects the circulation less than viridia.

Veratria (from Sabadilla seeds) is an irritant and excites sneezing, vomiting, purging, violent twitching and convulsions, and afterwards great muscular weakness with loss of electric irritability. The pulse is at first quickened and strengthened, then slowed, and afterwards becomes quick, weak, and irregular. The twitchings and convulsions are probably in part due to the effect of the veratria on the muscles and partly on the cord.

The twitchings and convulsions are not produced by the action of veratria on the brain, as they occur after section of the spinal cord. They are partly due to the direct action on the muscles, for they occur when the cord is destroyed, and in animals whose nerves are paralysed by curare.

Veratria heightens the reflex function of the spinal cord, powerful muscular contraction being excited by the movements of the animal or by an irritation. The frog soon becomes tetanized.

That veratria affects the cord, is shown by the experiments of Kölliker and Guttmann, who found that if an artery, the femoral or aorta, were tied and the animal then poisoned, still the parts protected by the ligature from the action of the poisons were tetanized.

Veratria produces in frogs great muscular weakness, loss of voluntary power and muscular contractility on galvanic stimulation. Veratria produces paralysis likewise in warm blooded animals, but tetanus very rarely.

How are these phenomena produced? By the direct action on the muscles, or by exhaustion from the convulsions (tetanic contractions)?

The general paralysis of the voluntary muscles is not owing to muscular exhaustion produced by powerful tetanic contractions: for paralysis is produced in warm-blooded animals without tetanus, and in frogs muscular contractility is lost in limbs protected from tetanus by division of their nerves; for on severing the femoral nerve the muscles lose their irritability as soon as those of a limb with an unsevered nerve, although, owing to the division of the femoral nerve, no tetanic convulsions in the limb takes place. Further, by tying the abdominal aorta to protect the posterior extremities from the influence of the poisoned blood, they became tetanized, but retained their irritability for a considerable time. The paralysis is not owing to any alteration in the trunks of the motor nerves; for, so long as the muscles contract under direct galvanic stimulation, so long do nerves conduct impressions to the muscles. The rapid occurrence of rigor mortis and acid reaction of the muscles make it probable that veratria kills the muscles; for these phenomena do not set in early after nerve-poisoning. Veratria induces rigor as soon as muscular irritability is destroyed. It produces no morphological change in the muscles till rigor mortis sets in.

Bezold and Hirt believe that veratria, besides acting on the muscles, paralyses the ends of the motor nerves.

After weak doses, a period occurred when the nerves failed to conduct impressions to the muscles, whilst the muscles themselves contracted after direct stimulation.

The effect of veratria on the sensory nerves has not been ascertained. Applied to the skin it causes numbness and therefore paralyses the sensory nerves.

Veratria affects the heart muscles like the voluntary muscles.

After death the heart is dilated and flaccid and does not contract by galvanic stimulation. It probably does not influence the heart through the pneumogastric nerves, at least after destroying the functions of this nerve by curare, veratria still paralysed the heart.

As veratria affects the frog's heart much less than the other muscles, and, as unlike the effect of most other cardiac poisons, the cessation of the heart's contractions takes place in physiological order, Guttmann concludes that it is less markedly a heart-poison than many other toxic agents.

Experiments appear to show that veratria first stimulates, and then paralyses the nucleus and terminations of the pneumogastric nerve, and the vaso-motor centre, and depresses the respiratory centre.

Veratria ointment excites a sensation of warmth and pricking followed by coldness. Unless applied for some time it does not excite inflammation, but it then produces a red itching rash. It is a very efficacious remedy in neuralgia, and like aconite has most influence over neuralgia of the fifth nerve. An ointment of the pharmacopœial strength is generally strong enough when applied to the face, but in other neuralgias a stronger ointment is required. Dr. Turnbull, who largely employed veratria ointment, used a preparation containing twenty and sometimes even forty grains to the ounce. These strong ointments not uncommonly prove very useful in sciatica when rubbed along the course of pain for twenty minutes to half an hour, twice or three times a day. This strong ointment is sometimes useful in the neuralgic pain consequent upon shingles. The susceptibility to its action varies; thus, in some persons it readily produces numbness and a sensation of coldness which may last several days.

Like aconitia ointment, it is often useful in sick headache, where the pain is accompanied and followed by tenderness of the skin. It should be well rubbed over the seat of pain on the very commencement of the attack. It excites less irritation and sometimes succeeds better than the aconite, often very quickly subduing the pain, preventing the vomiting, and reducing the duration of an attack to one or two hours, or even to a few minutes, while previous to the veratria treatment it used to last one, two, or three days.

Dr. Turnbull used a strong ointment to rheumatic joints, and no doubt it relieves some cases, although, unfortunately, it more generally fails.

Turnbull also applied the ointment to the chest of patients suffering from heart disease, with rapid irregular pulse, hurried breathing, much lividity and dropsy, palpitation and inability to lie down—to cases indeed usually benefited by digitalis. These symptoms, the ointment not uncommonly relieved, the patients passing a large quantity of urine, even six pints a day. He maintains that it acts differently on the system when absorbed by the skin than when administered by the mouth. He likewise employed a strong ointment to the painful joints at the onset of an attack of gout. Care must be taken, especially with the stronger ointments, not to apply them to the broken skin, or they will excite much pain and inflammation.

When sniffed up the nose the smallest quantity excites violent sneezing, sometimes lasting for hours.

The active principles of these substances pass readily into the blood, as is sufficiently proved by the symptoms they occasion; dull, heavy, frontal headache, sometimes accompanied by shooting or stabbing pain over one or both brows, in the pit of the stomach, and at the region of the heart. The heart is greatly affected: for the pulse grows slow and weak, and may sink from 70 or 80 to 40 or 35 beats in the minute, becoming at the same time so feeble as scarcely to be felt at the wrist. Pushed to the full extent this drug greatly prostrates the muscular strength, to the extent, perhaps of rendering walking impossible, and the muscles may twitch and jerk spasmodically. The surface is bedewed with a clammy sweat, the features are pinched, and there may be complete blindness and deafness, but delirium is rare. Dangerous as these symptoms appear, yet they speedily pass away if the drug is discontinued. Some self-experimenters have experienced dull aching pains, made worse by movement, and tonic and atonic contractions of the muscles, sometimes violent, especially of the face and extremities. This substance has the same prostrating effect on birds, and in America is sometimes used to destroy these animals; it makes them too weak to fly, and thus they are easily caught; but if left awhile, the effects of the drug pass off, and they escape.

Veratrum has been compared, on the one hand to digitalis; on the other, to aconite. Like digitalis, it is said to strengthen the contractions of the heart, and to weaken them only when the dose is excessive. The properties of veratrum appear to be more allied to those of aconite.

Veratrum has been said to lower the temperature in health: but this is not the case according to the late Dr. Squarey's observations on University College Hospital patients.

Veratrum viride has been employed in the convulsions of children, chorea, typhoid fever, scarlet fever, measles, pneumonia, and pleurisy. In regard to pneumonia and pleurisy, some authorities consider that veratrum is useful only in the sthenic forms, acting then like tatar emetic or aconite; others, however, as confidently recommend this remedy in the asthenic forms. Numerous published cases tend to support the efficacy of this remedy in pneumonia. Of forty cases published by Dr. Kieman, five died, making a percentage of 12·5; but some of these were in a desperate condition before undergoing treatment, so that the percentage is probably higher than it would have been had the medicine been employed at the beginning of the attack. Dr. Drasche has recorded seventy-three cases, showing the beneficial effect of the remedy. It greatly lessened the pulse, and lowered the temperature from 1° to 3° C., quieted the breathing, changed the character of the expectoration to a light yellow colour, rendered it scantier, and calmed the patients. It did not appear to shorten, but seemed even to lengthen the acute stage. This observer states, that veratrum retards the resolution of the lung, and sometimes produces vomiting of watery grass-green fluid, and occasionally diarrhœa. On discontinuing the remedy before the decline of the disease, the pulse again immediately rises. The experience of others, though favourable to the veratrum treatment, has not been so successful; indeed, it is obvious how very difficult it is to ascertain whether the effects attributed to it were really due to the veratrum. According to some observers, veratrum reduces the pulse, but often only temporarily, and if its effects are to be maintained, it must be given in increasing doses. Further, while it is admitted that the temperature is reduced, it is not lowered to the extent stated by Drasche, nor is the inflammation checked or shortened.

Typhoid fever, it is said, may be beneficially treated by veratrum.

Oulmont has pointed out that the alkaloid veratria will not produce the effects just described, which must therefore be owing to some other constituent of the plant; hence the tincture, not the alkaloid, should be used.

In the treatment of the foregoing diseases it is better to give small doses, as one or two minims every hour, rather than larger ones at longer intervals. It has been pointed out already, that it is requisite to augment the dose gradually in order to keep the pulse down, otherwise it will sometimes suddenly rise to 120 or 140 beats, which, however, may be reduced again in a few hours by a small increase of the dose.

Veratrum is said to be efficacious in removing the pain of acute rheumatism, and in controlling and shortening the fever. It is also said to be of service in neuralgia, sciatica, and lumbago, and in the "congestive headache" which occurs at the menstrual period.

Veratrum album has been used with success in the vomiting and purging of summer diarrhœa.

COLCHICUM.

While the physiological effects of colchicum, are very similar to those of veratrum, yet one drug cannot be therapeutically substituted for the other.

Strong preparations of colchicum, applied to the skin, irritate, excite redness, pricking, and smarting, and the powder of the colchicum sniffed up the nose excites sneezing and watery discharge from the eyes and nose.

Colchicum is acrid to the taste, produces much irritation of the fauces, with increase of saliva, sometimes in such quantity as might well be termed salivation.

Colchicum is an irritant to the stomach and intestines, and produces its effects, whether swallowed, or injected into the veins.

Small doses, continued for some time, produce a coated tongue and disagreeable taste, impair the appetite, excite more or less thirst, with pain at the epigastrium, rumblings of the stomach, and looseness of the bowels.

Should vomiting occur, the ejected matters are bilious, or composed of mucus, and after a large dose may contain blood. The stools are soft, or even liquid, and of a high colour; but after a large or poisonous quantity they are at first of the character just mentioned, but afterwards become dysenteric, consisting of slime and blood, accompanied with much straining and cutting pains in the belly. Even when injected under the skin, colchicum affects the intestinal canal in the same way.

Colchicum is rarely used in diseases of the alimentary canal. It has been employed as a cholagogue. Rutherford, in his recent investigations, finds that colchicum in large doses, given to fasting dogs, considerably increases the biliary secretion and at the same time it purges powerfully.

Colchicum, it is supposed, is most serviceable in both gout and rheumatism when it purges; but others hold purgation to be not only unneceesary but injurious; and there is no doubt that colchicum will as quickly cure an attack of gout without purging.

Colchicum quickly enters the blood, and in full doses soon excites warmth at the stomach, with a glow and outbreak of perspiration of the whole surface of the body, throbbing of the vessels, and reduction of the force and frequency of the pulse.

Poisoning by this plant, or its preparations, produces profound prostration, sometimes pain in the head, pinched features, perspiring, clammy skin, small weak or intermittent quick pulse, and not unfrequently strong muscular twitchings, accompanied by pain; indeed, pains have been felt in all the extremities, and

Dr. Henderson narrates a case in which most of the joints were painfully affected. Colchicum is said to cause pain in the urinary tract, with smarting on micturition.

After a quantity sufficient to produce the symptoms just detailed, the stomach and intestines are found much congested and inflamed.

It is reputed to be diuretic, and to stimulate, even in healthy persons, the secretion of a large quantity of urinary water and uric acid; but these statements have not been confirmed by the observations either of Böcker or Garrod, which show that if it acts at all on the kidneys, colchicum rather lessens the amount of excreted water, urea, and uric acid.

To Dr. Garrod the profession is indebted for an exact knowledge of the nature of gout. This philosophical observer has shown that in gout there is retention, with possibly increased formation, of uric acid in the system. From the urine of gouty patients, very little, and in some cases, even no uric acid can be obtained, while plenty can be detected in their blood. The urates thus circulating through the tissues are deposited in various parts of the body, and excite active and painful inflammation.

It is argued, however, that urates are not deposited in the cartilaginous and fibrous tissues, for it is said if so they should be more abundant, close to the vessels, whilst it is well known that they are earliest seen and exist most plentifully in cartilages, near their synovial surface, that is at the greatest distance from the blood-vessels; hence it is maintained that the urates are not deposited but are always associated in gout with much mal-nutrition; thus an excess is formed of urates which remain unabsorbed in the slightly vascular and non-vascular tissues, and of course accumulate in those structures at the greatest distance from the vessels. If this view is correct the gouty inflammation cannot be set up by the irritation excited during the deposition of the urates, but is due to some hitherto undiscovered cause.

Colchicum, it is well known, gives prompt relief from the pain, inflammation, and fever of gout. But how? Does colchicum cause the elimination of uric acid from the system through the kidneys, and so remove the condition on which the gout immediately depends? Now Dr. Garrod has experimentally shown that colchicum exerts no influence on the elimination of uric acid in gouty people. Colchicum must, therefore, control gouty inflammation without in any way affecting the condition on which the gouty inflammation in the first instance depends. Hence colchicum is merely palliative, removing for a

PODOPHYLLUM.

PODOPHYLLUM is a powerful purgative, and is generally considered a cholagogue.

Dr. Anstie, who has studied the action of the podophyllum on dogs and cats, found that in from two to ten hours after the injection of an alcoholic solution into the peritoneal cavity, and after the effects of the alcohol had ceased, podophyllum excited vomiting and almost incessant diarrhœa. Dr. Anstie does not usually describe the character of the stools; but in one experiment he states that they consisted of glairy mucus, and in two other experiments the stools were highly coloured with what looked like bile. In many of the experiments the stools contained blood. The animals suffered great pain, and soon became exhausted. At the *post-mortem* examination the œsophagus was healthy, but the stomach somewhat congested, induced, Dr. Anstie suggests, by the violent efforts of vomiting. The small intestines, especially at the lower part of the duodenum, were intensely congested, and in some instances the lower part of the duodenum was extensively ulcerated. The large intestines were but slightly inflamed. Although the injections were poured into the abdominal cavity, the peritoneum itself was not at all inflamed, not even around some unabsorbed granules of podophyllin. The contents of the intestines were liquid. In all the instances in which the effect of the medicine on the heart and respiration is mentioned, respiration ceased before the heart stopped.

From these experiments it appears evident that podophyllin has an especial affinity for the small intestines, and chiefly for the duodenum.

The results of these experiments, and the fact that podophyllin produced no apparent change in the liver, led Dr. Anstie to conclude that it is not a cholagogue. The Edinburgh Committee carefully investigated the action of podophyllin on healthy non-fasting dogs, and their reporter, Dr. Hughes Bennett, states that doses of podophyllin varying from two to eight grains diminished the solid constituents of the bile, whether purgation took place or not, and that doses which produced purgation lessened both the fluid and solid constituents of the bile. (See Mercury).

Indeed these investigators found that in non-fasting animals all the reputed cholagogues failed to increase the bile, and further, if they purged they even diminished it. Some experiments by Röhrig on fasting animals being opposed to these statements, led Dr. Rutherford to re-investigate this question. He finds that podophyllin injected into the duodenum of a fasting-dog, increases both the water and the solid constituents of the bile: and this increase is greater when the bile is allowed to flow into the intestine than when it is drained off by a canula. The augmentation of the secretion is greatest when the drug does not purge severely; indeed when it does purge violently it may lessen the biliary secretion.

Drs. Rutherford and Vignal confirm Röhrig's statements concerning the influence of other drugs on the liver secretion in fasting animals. They find that aloes, croton oil, rhubarb, senna, colchicum, taraxacum, and scammony, increase the biliary secretion; that podophyllin, aloes, rhubarb, colchicum, and croton oil, are the most powerful biliary excitants, senna and scammony less so; and that they all increase the water and the solids of the bile. Taraxacum they find is only a feeble hepatic stimulant. Rutherford thinks they act directly on the hepatic cells and not by increasing the blood supply. Röhrig found that calomel given to fasting dogs, would not recall the secretion when the flow had stopped though the drug would increase it when the bile had only diminished. Drs. Rutherford and Vignal find, however, that calomel generally lessens both the water and the solids of the biliary secretion, thus affecting alike fasting as non-fasting animals.

Drs. Rutherford and Vignal endeavour to reconcile the apparently conflicting results of their experiments and those of the committee, presided over by Dr. Bennett.

The absorption of food, they say, is undoubtedly followed by increased biliary secretion. The purgative probably diminishes the amount of food absorbed, seeing that it tarries a less time in the intestines and this probably overbalances in the course of the day the stimulation of the liver. "When such substances as podophyllin, rhubarb, aloes, and colchicum, are administered (*a.*) The liver is excited to excrete more bile, (*b.*) If purgation result, absorption of biliary matter and of food (if digestion is taking place) from the intestine is probably diminished, and thus by the twofold operation of increased hepatic action and diminished absorption of biliary matter from the intestine, the blood as it passes through the portal system is probably rendered more pure."

But, assuming that podophyllin is incapable of increasing the secretion of bile in health, it by no means follows that in this respect it is inoperative in disease. It is quite conceivable that podophyllin and other remedies may remove certain morbid conditions of the liver which arrested the secretion of bile, and so act indirectly but efficaciously as chologogues; and surely it is far better to promote the secretion of bile by restoring the liver to health, than to give a drug to compel a diseased liver to secrete. In the one case we remove the hindrance to the secretion of the bile; in the other, if it be possible, we compel the secretion in spite of the obstacle. The experience of those who have largely used this drug is strongly in favour of its possessing cholagogue properties; and my experience leads me to a like conclusion.

For instance, its effects are very marked on the motions of children with the following symptoms:—During the early months of life, especially after a previous attack of diarrhœa, obstinate constipation may occurr, with very hard motions, crumbling when broken, and of a clay colour, often mottled with green. Sometimes at each evacuation the passage of the hard stools through the sphincter of the rectum occasions great pain, causing the child to scream. At the same time there may be much flatulent distention of the belly, which excites frequent colic, this, in its turn, making the child cry, often without cessation. This morbid condition of the motions is frequently observed in children one or two months old, who are fed instead of suckled. I know nothing so effectual in bringing back the proper consistence and yellow colour to the motions as podophyllin. A grain of the resin should be dissolved in a drachm of alcohol, and of this solution one or two drops given to the child on a lump of sugar, twice or three times a day. The quantity administered must be regulated by the obstinacy of the bowels, which should be kept open once or twice a day. Under this treatment the motions often immediately become natural, the flatulent distention of the belly gives way, and the child quickly improves. The restoration of the colour of the motions is probably owing to the increased secretion of bile induced by the podophyllin.

That disagreeable cankery taste, unconnected with excess in alcoholic drinks, generally occurring only in the morning, but sometimes continuing in a less degree all day, gives way usually to podophyllin; and, if it fail, mercury generally answers. This symptom, it is true, when due to constipation, is removable by many purgatives, but podophyllin and mercury answer best.

Small doses of podophyllin are highly useful in some forms of chronic diarrhœa. Thus a diarrhœa with high-coloured motions, with cutting pains, is generally relieved by small doses of podophyllin, the bowels becoming regular, and the pain speedily subsiding; and this medicine is especially indicated if this form of diarrhœa occur in the early morning, compelling the patient to leave his bed several times, but improving after breakfast or by the middle of the day; or sometimes diarrhœa does not occur after breakfast, but returns early next morning. Indeed podophyllin will generally cure this morning diarrhœa, even if the motions are pale and watery. (Rumex Crespus is also recommended for morning diarrhœa). By means of podophyllin I have cured chronic diarrhœa of watery, pale, frothy motions, with severe cutting pain, even when the diarrhœa has lasted for many years. Two or three minims of the solution just mentioned should be given three or four times a day.

Podophyllin is very useful in some forms of sick-headache (megraine). The nature and the order of the symptoms differ greatly in different cases of sick-headache. Some, for instance, are accompanied by constipation, others by diarrhœa, and in each of these kinds the stools may be either too light or too dark in colour. But there are, besides, many other varieties of sick-headache. Where the headache is preceded, accompanied, or followed, by a dark-coloured bilious diarrhœa, podophyllin generally does good. Two or three minim doses of the foregoing solution, given three times a day, will restrain the diarrhœa, lighten the colour of the motions and, if the medicine, is persevered with, either prevent the attacks, or considerably prolong the intervals. When the diarrhœa is of a light colour, and the motions evidently contain too little bile, a hundredth part of a grain of bichloride of mercury, given three times a day is often very useful. Again, when the headache is accompanied by constipation, and the motions are of a dark bilious character, a free podophyllin purge every day or every alternate day, is very beneficial. Even in those nervous headaches, occurring either just before, at, or directly after, the menstrual period, if associated with constipation and dark-coloured stools, purgative doses of podophyllin often give relief.

It is now generally held, that in sick-headaches or as they are often termed nervous headaches, megraine, hemicrania, the origin of mischief is situated in some part of the central nervous system, and therefore it is asked:—What is the use of giving medicine to act on the stomach, liver or intestines?

Whilst very probably the affection in megraine is situated in the central nervous system, involving in simple cases part of the nucleus of the fifth and the centre for vomiting, and in other cases a still larger area; yet the affection appears to be dormant till roused into activity by peripheral or other exciting causes—causes in many cases due to the stomach, the liver, or the intestines. In such cases, the sickness, the diarrhœa, or the constipation precede the attack; where these symptoms accompany or follow the paroxysm they may fairly be considered as part of the attack depending on changes occurring in the central nervous system. The treatment of megraine therefore, falls into these divisions; 1, removal of the exciting cause, 2, medicines directed to alter the condition of the central nervous system producing the attack, 3, treatment of the attack itself.

Where sickness, diarrhœa, or constipation precede the paroxysm they act as exciting causes, and if we can remove these symptoms by the aid of mercury or podophyllum according to the foregoing directions we prevent the development of the attack or at all events render it milder. Even when these symptoms accompany the attack and form therefrom very probably an integral part of the paroxysms, these remedies or others like nux vomica acting either on the stomach or liver may suppress the paroxysm; for although it may be plausibly urged that it is folly to treat the effects in order to remove the cause, still, as we have seen, in the section treating of counter-irritants, as local applications to the seat of pain appear to control the central nervous disease, so there is no reason why a remedy which affects the terminations of the vagus should not also be capable of modifiying the central affection.

Some American physicians go so far as to say that this drug, in America called vegetable mercury, fulfils all the indications of mercury.

The injection of podophyllin under the skin has been recommended. It is readily soluble in equal parts of liquor potassæ and water; and, if the drug is pure, the addition of water does not precipitate this solution. The injection of this solution to the extent of one-third to one-tenth of a grain quickly purges, sooner, it is said, than when given by the stomach, and it caus no pain.

Podophyllin is a rather uncertain purgative; thus, a d adequate to purge one person violently, will be inoperative on another. Individual differences occur, it is true, with other purgatives, but the action of podophyllin appears more uncertain than other similarly acting drugs. Again, the time it takes to act varies, purging some in a few hours, whilst with others it takes twenty-four hours. Sometimes instead of freely relieving the bowels it frets them by causing frequent attempts with ineffectual results. The pure drug causes very little griping. In too large doses, it is very apt to produce slimy and bloody stools, particularly in children.

STAPHISAGRIA.

THIS seed, made into an ointment, is employed only as an external application, to destroy the lice which infest the bodies of dirty persons.

Formerly the seeds were ground to a meal, which was mixed with a simple ointment, but owing to the large quantity of oil in the seeds the meal was always very coarse, so that the ointment thus made was a gritty and uncomfortable application. This inconvenience Squire has remedied. "Finding" he says "that this meal contained a certain amount of oily matter, the author had the oil removed from a small quantity of the meal by percolation with ether, and found that the meal was then capable of being reduced into a fine powder." This powder he tried in several cases of phthiriasis (louse disease), and found it quite inert. The proportion of oil extracted from the meal amounted to half the weight of the meal. On making trial of the oil, suitably diluted with olive oil, he found it as efficient as any remedy he has ever tried against phthiriasis. "A cheap way of preparing the oil for application is to digest the seeds in melted lard, and strain while hot. The filtrate is an ointment of the seeds of staves-acre. Two drachms of the bruised seeds should be used to an ounce of lard."

ACTÆA RACEMOSA.

This medicine is used much more extensively in America than in England. It has been employed for centuries by the Indians and settlers, for chorea and many uterine diseases, and to assist the womb to expel the child. Those with most experience of this drug speak loudly in its praise.

It is not used as a local application to the skin. Some assert that given internally it will prevent the pitting of small-pox.

Actæa is said to be useful in simple and malignant sore-throat, and in that troublesome, chronic, and obstinate disease, in which the mucous membrane of the pharynx is quite dry, and spotted over with inspissated mucus.

So far as I know, this remedy is not used in stomach or intestinal disease.

Absorbed into the blood, it depresses both the force and frequency of the pulse. Some compare it to aconite, and use it for similar purposes. It has been given, it is said, with much success in influenzas and catarrhs, accompanied with headache, stiffness of the muscles, dull, aching pain in the bones, and a bruised sensation as if the body had been beaten all over.

This plant has been much used in acute rheumatism and it is stated that it quells the pain speedily. It is also extolled for lumbago and sciatica; and it is said to subdue lumbago more effectually than any other remedy.

I have given this plant a patient trial in lumbago and sciatica, and in those cases of chronic rheumatism where one part of a tendon, muscle, or articulation in the back or elsewhere, is exquisitely painful on movement, and in cases characterised by great stiffness of the muscles of the back, loins, and hips, but unfortunately with very little if any success, yet my friend Mr. Joseph Bartlett has recently employed this remedy in these cases with considerable success. In my hands, however, this remedy has yielded very satisfactory results in certain forms of chronic rheumatism; for instance, in rheumatoid arthritis, where the joints are enlarged and much stiffened. It does not, however, suit all cases alike but those best when the pains are worse at night; and this remedy may be considered especially indicated when the disease is traceable to some previous derangement of the uterus, as sudden suppression of the menses, an abortion, a painful and difficult confinement, or to the disappearance of the catamenia at the natural term. The joints, it may be, are not enlarged, and the pains may flit from joint to joint instead of lodging steadily in one place. Painful cramps of the legs which break the sleep, and are aggravated by wet and cold weather, and by certain winds sometimes torment such patients. In these cases, actæa independently of its possible narcotc action not unfrequently gives considerable relief from pain and cramps and induces quiet and refreshing sleep. But, while the indications just given are for the most part to be depended upon, it must be confessed that this remedy does sometimes relieve chronic rheumatism and rheumatoid arthritis occurring in men, and sometimes is serviceable in those cases in which the pains are worst during the day.

Again, in a case like the following, actæa is signally beneficial:—A patient is first troubled with pains, apparently rheumatic, in most of the joints, but with scarcely any fever or swelling. The disease soon seats itself in one part, as the wrist and hand; the tissues here become much thickened, the bones of the wrist enlarged, till after a time all movement is lost, and the member becomes useless. Warmth allays the pain, which almost ceases at night. The attack presents many of the characters of gonorrhœal rheumatism, but there is no history of gonorrhœa. I have several time observed the almost instant relief given by this drug in cases like that just described, after iodide of potassium and other remedies had been fairly tried in vain, the pain giving way at once. and the joints becoming again supple and useful.

Chorea, it is said, whether rheumatic or otherwise, yields to actæa, a statement I have put to the test of experience, and found that actæa fails altogether when there is no history of rheumatism, but apparently succeeds sometimes when the chorea is of rheumatic origin. It is greatly inferior to arsenic in chorea.

According to American therapeutists, this plant operates powerfully on the uterus, its action on this organ is stated to be very similar to that of ergot, stimulating the contractions of the parturient uterus, and hastening the expulsion of the child. Ergot produces a continuous contraction of the uterus, while actæa, it is said, merely strengthens, but does not prolong the contractile movements, and therefore endangers less the child's life and the soft structures of the mother.

Actæa is said to be useful, in expelling the placenta and in preventing after-pains, but ergot is preferable, as it produces more persistent contractions. Actæa has been recommended in amenorrhœa, dysmenorrhœa, and in menorrhagia. Though inferior to other remedies it certainly controls menorrhagia.

Again, actæa racemosa, it is said, will restore the secretions, and remove the accompaning symptoms, when the menses are suddenly checked from cold, shock, or mental emotion, or when, from similar circumstances, the lochia are suppressed, distressing symptoms are apt to occur, as more or less severe pain in the head, in the back, and down the legs, stiff sore muscles, and bearing-down pains.

It has been given too, to prevent miscarriages in irritable uterus and prolapsus uteri.

Actæa is said to be serviceable in that common and distressing headache occurring in nervous hysterical women, especially at the menstrual period, or when the flow is too frequent and too profuse, or at the change of life.

The plèurodynia dependent on uterine derangements is also enumerated among the many troublesome complaints over which actæa is said to prevail.

Actæa is said by Sir J. Simpson to be highly beneficial in the cases of women, who, during pregnancy and after confinement, occasionally suffer from great mental disturbance, sometimes amounting to madness. (See Bromide of potassium.)

Actæa has been recommended in the headache arising from over-study or excessive fatigue.

The tincture, made in the proportion of four ounces of the plant to a pint of proof spirit, is the form generally employed. Five minims may be given every hour, or fifteen to thirty minims three times a day.

ACONITE AND ITS PREPARATIONS.

PERHAPS no drug is more valuable than aconite. It may be since the earlier editions of this handbook it is more frequently prescribed, and its virtues are more generally appreciated, and I venture to predict that ere long it will be yet more extensively employed.

Aconite is used externally in the form of liniment or ointment, to relieve pain. In the neuralgias, especially of the brow or face, these applications are often of the greatest use, in relieving the distressing pain, either permanently or at all events temporarily. It is decidedly more useful in facial than other forms of neuralgia, though in facial neuralgia it not seldom fails notably in those severe forms termed epileptiform neuralgia.

We are unable as yet to predict, with any certainty, the cases wherein aconite will succeed or fail; this much, however, is clear, that neuralgias depending on diseased bone, or on tumours pressing on nerves, are beyond the control of aconite; but these are not the only forms of neuralgia which will not yield to aconite. Facial neuralgia due to decayed teeth is often obstinate, yet even these cases frequently yield to the external application of strong aconite preparations. Sometimes a case will require the assiduous application of the aconite preparation during three or four days. In neuralgia, however, due to this cause, aconite sometimes quickly loses its effect and the pain returns with its former frequency and severity.

As no harm can follow the employment of aconite externally, it should always be tried; and if unsuccessful, then recourse can be had to other modes of treatment. If aconite will succeed at all, it will generally succeed at once; hence, if relief does not come speedily, it is useless to continue it. The preparation should be sufficiently strong to produce decided numbness and tingling in the skin.

A piece of the ointment, the size of a bean or nut, should be applied with friction, which enhances its efficacy. This quantity should be repeated until it induces a sensation of tingling. The liniment, applied with a brush, may be mixed with one half the quantity of chloroform liniment to assist absorption.

In cases where many branches of the fifth are affected, it is often sufficient to apply the aconite over the seat of the most intense pain; and again in cases where other nerves, like the great occipital and auricular nerve, are likewise involved, the application of the aconite over the branches only of the fifth most severely affected will often give complete relief.

Then we meet with cases of which the following may be taken as a type:—A woman suffers from severe neuralgic sick headache, preceded by general malaise and a dark discolouration round the eyes; the pain affects, perhaps, only a small branch of the fifth, not uncommonly that twig situated near the outer canthus of the eye, and when this happens, a neighbouring vein often becomes greatly swollen. The pain lasts with great severity a variable time, extending even to one, two, or three days, accompanied with more or less severe vomiting, the rejected matter being, perhaps, intensely acid. As this pain declines, the patient feels severe shooting pains passing up the back of the neck and head behind the ear, affording a sure indication of the approaching decline of the attack; the secondary pain lasts three or four hours, then ceases, leaving the patient limp and weak,

The application of aconite ointment or aconite liniment, at the very beginning of the attack, over the affected branch of the fifth nerve, will cut short the pain, prevent sickness, and the occurrence of the secondary pain in the back of the neck and head. In some cases veratria succeeds better than aconitia ointment.

When the auriculo-temporal nerve is affected, the salivary secretion may be increased, diminished, or altered in character; and the secretion of tears may be modified in the same manner when certain branches of the supra-orbital nerve are affected. The aconite application, by removing pain, will restore these secretions to their natural state.

Aconite is often of great service in sick headache, and is indicated when the attack is accompanied and followed by tenderness of the painful region. The aconite application not unfrequently arrests the pain, moreover, in arresting the pain it prevents the sickness, thus affording an excellent example of a local application affecting a distant organ.

While using these powerful poisonous applications, care should be taken not to rub them into wounds or cracks of the skin, and to avoid contact with absorbent tissues, as mucous membranes and the conjunctiva. Spinal irritation, and intercostal neuralgia and sciatica yield, in some instances, to aconite ointment; but spinal irritation and intercostal neuralgia give way more readily to belladonna preparations.

Given internally, aconite at first induces a sensation of warmth at the pit of the stomach and sometimes nausea and vomiting. The sensation of warmth spreads over the body, and tingling of the lips, tongue and adjoining parts is soon perceived: the uvula, and the tongue feel as if swollen and too large, and deglutition is frequent. A large dose induces tingling and numbness at the tips of the fingers, thence spreading over the whole body, accompanied by diminished sensibility and some muscular weakness, which, with a very large dose becomes extreme, and is one of the most prominent and important symptoms of the drug.

The action of aconite on the circulation and respiration is most noteworthy. Moderate doses greatly reduce the number of the heart's beats, even to 40 or 36 in the minute; but after a larger and dangerous dose the pulse beats faster, and may become irregular; sometimes even a small quantity excites irregular heart action. Whether increased or lessened in frequency, the pulse always loses strength, showing retardation of the circulation. Dr. Achscharumow and Dr. Fothergill (see *Digitalis*), have shown that aconite paralyses the heart of frogs, arresting the contractions in the diastole. The effects on respiration are very similar; moderate doses render the breathing slower; but a large and poisonous quantity often makes it short and hurried.

How does aconite affect the heart? It certainly affects either the muscular substance or the contained ganglia of the heart. On this point all observers are agreed, for aconitia affects the heart after section of the pneumogastric or the administration of atropia which paralyses this nerve; and it affects the extirpated heart in the same way as it affects this organ in situ. It is maintained, however, that it acts also through the pneumogastric, Böhm and Wartmann believing that it paralyses the terminations of this nerve; Achscharumow that it first stimulates the inhibitory centre of the pneumogastric, and so slows the heart, and then the pneumogastric becomes exhausted and at last paralysed, and then the heart beats quickly and irregularly.

The heart muscle appears also to be affected, for after death it fails to respond to galvanic stimulation.

So far as we may draw a conclusion from the scanty experimental evidence on the subject, it appears that aconite does not affect the vaso-motor centre or nerves, and therefore the lessened arterial pressure it induces is due to its action on the heart.

It is generally held that aconite affects respiration by its influence on the respiratory centres.

The views concerning its action on the nervous system are very diverse. Achscharumow concludes that it paralyses both the trunk and terminations of the cerebro-spinal motor nerves but leaves the muscles unaffected.

He tied the aorta of frogs, thus protecting the hinder extremities from the poisoned blood, and then injected aconitia under the skin of the back. All except the protected parts speedily became paralysed, and the nerves of the upper extremities failed to conduct impression to the muscles, whilst electrical stimulation of the sciatic nerve provoked energetic muscular contraction. The muscles subjected to the influence of the poisoned blood contracted on the direct application of galvanic stimulus, though they failed to respond to irritation of the motor nerves distributed in them.

Böhm and Wartmann conclude from their experiments that aconitia first paralyses the sensory and then the motor part of the cord.

Liegeois and Hottot believe that it first paralyses the "perceptive centres" above the spinal cord, and afterwards the terminations, and lastly the trunks of the sensory nerves.

They found this conclusion regarding its influence on the sensory nerves, on this experiment.—They produced anæsthesia in a frog by aconite. Was this due to the action of the poison on the sensory perceptive centres or on the afferent (sensory) nerves? On administering strychnia, they produce tetanus, paroxysms of which could be excited by irritating any part of the body, they therefore conclude, that at this stage the afferent (sensory) nerves are not affected, and that the anæsthesia depends on the influence of the aconite on the sensory perceptive centres. After a time, however, irritation of the terminations, and subsequently of the trunks of the afferent nerves fail to excite a tetanic paroxysm; whence they conclude that aconite next paralyses the terminations and then the trunks of the sensory nerves. It may be pointed out, that this reasoning holds good only on the assumption that sensory nerves have a double function, and, besides conveying impressions to the brain will excite reflex action in a frog; but, if it should happen that sensory nerves differ from those which conduct impressions to be reflected through the cord, then the experiment would simply prove that afferent reflex nerves are not so soon paralysed as afferent sensory nerves.

During the administration of aconite, cutting pains in the joints and other parts of the body are often complained of, and sometimes an eruption of itching vesicles breaks out on the skin. Delirium occurs in some cases, but after fatal doses the mind often remains clear to the last. The muscular weakness is extreme, and frequent faintings occur. Blindness, deafness, and loss of speech occurred in some fatal cases.

As aconite diminishes sensibility, it has been used internally in various painful diseases; but, for the relief of pain, other internal remedies have for the most part superseded it.

The power of aconite to control inflammation and subdue the accompanying fever is remarkable. It will sometimes cut short an inflammation. Though it will not remove the products of inflammation, yet by controlling inflammation aconite will prevent their formation, so saving the tissues from further injury. It is therefore in the early stage of inflammation more conspicuously serviceable: still, although the disease may have advanced to some extent, and injured the implicated organs by the formation of new and diseased products, yet while the inflammation is still going on aconite does good; indeed its beneficial effects are often visibly apparent in pharyngitis, tonsillitis, etc.

Dr. Fothergill has recently advanced some ingenious views regarding the way cardiac depressants, like aconite, reduce fever and inflammation.

First, regarding their influence on the preternatural heat of fever, Dr. Fothergill holds that aconite slows and weakens the heart, hence the circulation becomes less rapid with corresponding decrease in its chemical changes, this diminished oxidation involving of course diminished production of heat. Aconite likewise increases the flow of blood to the skin, rendering a dry skin moist and perspiring, and in this way, too, yet more heat is lost by radiation and evaporation.

Now, by making a dry skin moist, we must of course abstract a certain amount of heat by evaporation, and to this extent cool the patient, but I think various valid reasons may be given why the loss of heat induced by this manner plays but an insignificant part in causing that great fall of temperature so often produced by aconite.

1. Whenever aconite promotes perspiration a proportionate reduction of temperature ought to take place in all diseases; but whilst in many cases as in tonsillitis, &c., the fall ot temperature is considerable, in other forms of fever, though the perspiration may be very free, scarcely any, or even no fall of temperature takes place; for instance, in many cases of erysipelas, pneumonia, pleurisy, and especially in the specific fevers over which, as we shall see, aconite exerts very little control, the fever continuing unchecked by it.

2. Aconite not uncommonly quickly reduces the temperature without promoting sweating, especially with children, in whom this drug, in many instances, fails to produce perspiration.

3. Sometimes we see cases like the following:—In typhoid or scarlet fever a patient, with a hot dry skin, whilst taking aconite, becomes in a few hours freely bathed with perspiration which continues several days, but afterwards in spite of aconite the skin again becomes quite dry. Now in a case like this we find the temperature undergoes no change, remaining as high during the sweating as before the administration of aconite, and not rising on the cessation of the perspiration.

4. In order to test the influence of perspiration on the temperature of fever, I have three times performed a testing experiment, in conjunction with Mr. Alfred Gould. We gave to a fever patient with a dry skin, a hot-air bath, with the exception of her head and face. When very free perspiration came on, the bath was removed and the patient covered lightly with clothes, and in this state the

perspiration continued some hours afterwards. Whilst in the bath the temperature did not increase, nor did it fall at all after the bath, notwithstanding the free perspiration and light clothing. If it be objected that the clothing prevented evaporation and the consequent reduction of temperature, we may reply that these are the same conditions under which aconite in so many instances causes such marked decline of temperature.

Like Dr. Fothergill, many other observers attribute the preternatural heat of fever, to diminished loss of heat through dryness of the skin. Whilst the production of heat continues in undiminished amount and finds no outlet through the skin by evaporation, it must accumulate and raise the body's temperature. To test the validity of this view, I gave to a patient with quotidian ague, whose temperature in the fever-stage rose to 105° and 106° Fah., half a grain of pilocarpine (the alkaloid of jaborandi) just before the onset of the fever, and in twenty minutes produced copious perspiration, and yet in spite of this, the temperature rose six degrees to (104·4°), and the fit lasted as long as on previous days; the temperature falling short of the attacks on the previous days by about a degree. As in ague the untreated fits often differ to a greater extent than this, it is doubtful if even this slight diminution was due to the jaborandi. A similar experiment is often seen ready made to our observation in cases of acute rheumatism, with high fever and a drenched skin.—In regard to the ague cases, we may add that the sweating produced by the jaborandi had very little influence on the shivering and blueness of the lips, nose and extremities.

Fothergill attributes the effect of aconite and other cardiac depressants on inflammation to their influence on the vascular system. It has been shown that the vascular system is always in a state of semi-contraction, and that by paralysing the vaso-motor nerves, it is possible to double its capacity. Aconite, he says, dilates the arterioles and greatly increases the capacity of the vascular system, and by this means drains blood away from the inflamed organ, in fact this drug "bleeds the patient into his own vessels." As the vessels leading to an inflamed organ are already paralysed, aconite does not augment the supply of blood to it. Were this view correct a remedy should produce the same effect on all inflammations, but we know that whilst colchicum promptly subdues gouty inflammation, it possesses very little influence on other inflammations, as pneumonia. Again, many observers believe with reason that aconite exerts an especial action in tonsillitis. The inflamed tissues it may be urged, are here of small extent, so that the depletion will consequently be much more effectual than when a larger tract of tissue is involved.

The results of aconite are most apparent when the inflammation is not extensive, or not very severe, as in the catarrh of children, in tonsillitis, or in acute sore throat. In these comparatively mild diseases, especially if the aconite is given at the earliest stage, when the chill is still on the patient, the dry, hot, and burning skin, becomes in a few hours comfortably moist; and then in a little while is bathed in profuse perspiration, often to such an extent that drops of sweat run down the face and chest. With the sweating comes speedy relief from many of the distressing sensations, as restlessness, chilliness, heat and dryness of the skin, aching pains and stiffness; the quickened pulse simultaneously becomes far less frequent, and in a period varying from twenty-four to forty-eight hours both pulse and temperature reach their natural state. If caught at the commencement, a quinsy or sore throat, rarely fails to succumb in twenty-four to forty-eight hours. After the decline of the fever the sweating, to the annoyance of the patient, may on slight provocation continue for a few days. If administered early enough the beneficial effects of the drug soon become strikingly apparent. Thus large, livid, red, glazed, and dry tonsils, will in twenty-four hours present the aspect indicative of the subsidence of the acute stage of inflammation, the disappearance of the swelling with much redness, whilst the membrane becomes moist, and bathed with mucous or pus. Just at this stage, some strong astringent, as glycerine of tannin, or nitrate of silver, will remove most of the remaining diseased appearances, and the pain if any should remain. To those who may not have tried it, these visible effects of aconite on inflamed tonsils, etc., may seem exaggerations, but any one who will employ the aconite in the way we are about to point out can verify my statement.

Its effects on catarrhal croup, or, as it is sometimes termed, spasmodic laryngitis, are just as conspicuous. It removes the urgent dyspnœa in a few hours, and shortly afterwards subdues the fever, and almost extinguishes in a few hours an attack lasting usually three or four days. When there is little or no fever, it apparently checks spasms and croupous breathing, and in those rarer cases where these symptoms continue after the subsidence of the fever. Aconite is equally serviceable in severe colds, with much chilliness, great aching of the limbs, a hot, dry skin, and quick pulse.

Aconite is often of great service in an attack of asthma with the following symptoms:—The patient, generally a child, is first seized with coryza, accompanied perhaps with repeated and severe sneezing; then the inflammation passes down to the larynx, causing perhaps sore throat before the bronchial tubes are reached. The coryza may precede the bronchial symptoms by three or four days, ceasing when the chest symptoms begin, which, in the early attacks may consist only of cough with wheezing and very little shortness of breath, with inability [illegible] at night. As the disease advances the asthmatic [illegible] becomes more developed, and the coryzal symptoms often simultaneously decline, till at last well-marked bronchial asthma becomes established without any preliminary coryza, or the coryzal and asthmatic symptoms begin simultaneously. I believe that with children asthma often begins in this way, and throughout life it may retain more or less of its coryzal character. During the coryzal stage there is decided fever, and then is the time when aconite proves so serviceable; for given at the onset of the fever, aconite cuts it short and arrests the inflammation before it reaches the chest, and in this way averts the asthma. In other cases of asthma, though there is no coryza, the attack is ushered in by chilliness and fever, which for some days precedes the tightness of breathing, and here aconite, given at the very commencement of the fever, may avert the attack of asthma (See Arsenic).

In a variety of the above-described diseases, of which the ollowing account may be taken as a type, aconite is likewise beneicial. A patient is very prone to catch cold from the slightest exposure to a draft or to damp cold. The symptoms always ollow a definite order: the throat, first attacked, becomes sore, swollen, red, and beefy-looking; the soft palate, its arches, and the uvula may be implicated. The inflammation in a very variable time, sometimes almost at once, oftener after three, four or five days, spreads upwards to the nose causing coryza, and downwards to the chest producing catarrh and cough; sometimes the disease tends to pass upwards sometimes downwards to the chest. In bad cases, or cases that have lasted some time—and this affection may harrass a patient for years—the aspect of the throat never becomes natural, the mucous membrane always remaining swollen, red, and beefy-looking; exposure to cold or damp intensifies this condition, which then invades the nose and chest. This condition if left unchecked will induce emphysema toward middle age, through the repeated attacks of pulmonary catarrh. In the throat stage there is often fever, and aconite with belladonna given at the very outset of the attack, will often summarily cut it short and prevent the coryzal and lung symptoms. Applications to the throat are very useful in this troublesome and pertinacious affection. It is a good plan to "harden" the throat; to diminish its tendency to catarrh, by the nightly use of the cold wet compress, and daily swabbing with an astringent like glycerine of tannin. I have found the Turkish-bath and the inhalation of sulphurous acid and of carbolic acid useful in these cases.

In pneumonia, pleurisy, and the graver inflammations, the effects of this valuable drug, though not so rapidly, are often manifest.

In pericarditis accompanied with violent throbbing and extreme pain, aconite will speedily quiet the undue action, and so relieve the pain.

Most observers ascribe its influence on inflammation to its action on the heart, and point out, truly enough, that it is most useful in the sthenic forms of disease; and indeed, it may do harm unless care is taken where there is great weakness, with feebly-beating heart.

It appears to me that in fevers we can considerably reduce the frequency of the pulse without lessening the rapidity of the circulation. A moderate dose of aconite, whilst it makes the pulse less frequent, renders it fuller, stronger, and less compressible. This indeed we should expect, for if the heart does the same amount of work, after it beats slower, each individual beat must do much more work, so that if we reduce the pulse from 120 to 60, the heart must do twice as much work after it has been slowed by aconite. It may be said that though each beat is stronger, yet the heart is doing less work than when it was beating quicker. As tending to support the view that aconite weakens the heart's contractions, it must be admitted that even small doses after a time sometimes make the pulse unsteady and even irregular.

I would venture tentatively to suggest whether the slowing effect of aconite may not be useful by increasing the heart's period of rest and nutrition. The diastole of the heart occupies nineteen out of twenty-four hours, and is the period for rest and nutrition. When the heart is made to beat quicker the acceleration takes place at the expense of the diastole, thus shortening the time for rest and nutrition. By slowing the heart, aconite prolongs the diastole, and thus increases the time for the heart's rest and nutrition.

The method of employing the drug has much to do with its efficacy. It should be given, as already stated, without delay, at the very onset of the disease, every hour being important. Half a drop or a drop of the tincture, in a teaspoonful of water, should be given every ten minutes or quarter of an hour for two hours, and afterwards hourly; but if there is much prostration with feeble and weak pulse, a still smaller dose. Now and then a patient experiences nausea and even sickness after each dose.

We feel constrained to point out here the signal service rendered by the thermometer in enabling us to decide whether or not to give aconite. Indeed, in the treatment of inflammations, the thermometer and aconite should go hand-in-hand. If the symptoms and physical signs are not sufficiently developed to enable us to decide whether or not, an acute inflammation of some deep-seated part has set in, the thermometer will often clear up the doubt. No acute inflammation can exist without preternatural heat. Hence, in a doubtful case, if the temperature, after careful investigation, is found natural, the case is not one for aconite; while, on the other hand, if the other symptoms doubtfully indicate an inflammation, a rise in the thermometer will add considerably to the probability that we have to deal with an inflammation, and will indicate the advisability of employing aconite. Sometimes the throat is swollen, very red, and presents the appearance of an ordinary sore throat accompanied by fever, but fever is absent. Without the thermometer we are unable to discriminate with certainty these two kinds of inflamed throat, and the inability to distinguish the one from the other has often led, no doubt, to the mistaken use of aconite, so bringing discredit on this valuable drug. The non-febrile form is affected very little, if at all, by aconite.

Again, the use of the thermometer after scarlet fever is very important; for, as is well known, a patient is then liable to acute inflammation of the kidneys, the first onset of which is at once indicated by a rise in the body temperature. It is well, therefore, during the convalescent stage, to direct the nurse to take the temperature night and morning: and if this should rise beyond the healthy standard, she should at once give aconite, so as not to allow some hours to elapse before the patient can be visited by the medical attendant. The fever, it is true, may depend on some other cause than inflammation of the kidneys; but even then it will probably be inflammatory in character, arising from gastric catarrh, over-feeding, and the like, and in any case aconite is indicated.

It is doubtful whether aconite will shorten the fever of acute specific diseases, as scarlet fever, measles, &c., but it has a beneficial influence in these diseases, soothing the nervous system and favouring sleep by inducing free perspiration. Whether it can lessen the severity of the fever, or diminish the duration of the acute specific diseases, is doubtful; but there is no doubt that it can control the inflammatory affections which often accompany them, and which by their severity may endanger life. Thus aconite will moderate, but neither prevent nor shorten the course of the throat inflammation in scarlet fever and the catarrh and bronchitis in measles, and in this indirect manner it may lessen the height of the fever.

Aconite proves useless in certain epidemics of febrile inflammatory sore throat. These cases are met with chiefly during the prevalence of scarlet fever. The throat is much swollen, of a very dusky red colour, and the pulse is very frequent and very weak. There is great prostration, and the symptoms are of a marked typhoid character. Here stimulants, with the application of a strong solution of nitrate of silver, do most good.

The thermometer, again, renders notable service whilst giving aconite in the acute specific fevers and the sore throats just described. Under the influence of this drug, the skin becomes moist and the pulse falls perhaps to its normal state, and we might conclude that the temperature likewise had become natural, only the thermometer shows that it remains unaltered.

Aconite is of marked service in erysipelas. Administered at the commencement it often at once cuts short the attack; and even when in spite of it the disease continues, aconite will reduce the swelling and hardness, lessen the redness, and prevent the inflammation from spreading.

In children after vaccination, perhaps when the spots have nearly healed, an erysipelatous redness occasionally appears, spreading over the arm and a great part of the trunk, usually ceasing in one part, then successfully attacking contiguous parts, and leaving a yellow discolouration and desquamation. The redness is often intense, the tissues being very hard, painful, and shiny, and this inflammation may continue for weeks. It may run down the arm, involve the hand, and implicate the greater part of the chest; or it may appear in the leg, and gradually spread to the foot; or, again, it may spread from the hand up the arm, and once more down to the hand, and this may be repeated many times. Sometimes the inflammation terminates in small abscesses. In cases like these, aconite generally at once arrests the inflammation; and even when it persists aconite renders the redness less intense, and the swelling less hard and painful. The troublesome inflammation often arising after the vaccination of adults, ordinarily yields to aconite, especially if supplemented by the local application of belladonna ointment twice daily.

In the treatment both of simple inflammations and acute specific diseases, aconite may be appropriately administered in conjunction with any other remedy which may be indicated.

Aconite has been much praised by eminent authorities in the treatment of acute rheumatism, but its good effects are not so apparent as in acute inflammation. Acute rheumatism having no regular course or duration may last untreated only a few days, or may endure for many months. It is difficult, therefore, to decide, whether in certain cases the speedy decline of the fever is a natural decline, or due to the aconite. It is certainly ineffectual in many cases, which appear to run their course uninfluenced by this drug; so that it is still required to determine in what class of cases it is useful, and in what class of cases it is useless. It often appears to be of service, however, in subduing the pain from inflamed and swollen joints.

Gouty pains are said to yield to this remedy, and in many instances it has been given in neuralgia, apparently with good results.

It has been elsewhere shown that aconite lessens the rapidity of the circulation. It may, therefore, be used in all cases where it is needful to subdue vascular excitement; in fact, it may be given in precisely those cases which were formerly treated by bleeding.

In sudden check of the menses, as from cold, aconite will often restore the flux, and thus obviate the distressing and peculiar train of symptoms produced by arrested menstruation.

Dr. Bayes recommends aconite in otitis and states that it quickly relieves the pain.

Small doses of aconite, administered frequently, will often quickly check the nose bleeding of children and of plethoric people.

Aconite will usually subdue the "fluttering of the heart" of nervous persons, and also nervous palpitations. More general treatment is often required; but when the conditions causing the disturbance are undetectible or irremovable, then aconite may be usefully employed.

In several cases I have seen aconite quiet the distressing restlessness or "fidgets" which affects men as well as women, and have known one drop at bed time calm the patient and permit sound refreshing sleep; if one drop is insufficient it may be repeated hourly for three or four hours.

A drop of tincture of aconite each hour yields satisfactory results in the acute stage of gonorrhœa; and it is even said to remove chordee.

DIGITALIS AND ITS PREPARATIONS.

LARGE doses of digitalis excite nausea, vomiting and diarrhœa; the matters voided, either from the stomach or bowels, being of a grass-green colour, due to the action of the gastric juice on some constituent of the digitalis. These results may follow even a medicinal dose.

The digitaline readily passes unchanged from the intestines into the blood; for the same symptoms ensue whether the alkaloid is swallowed or injected into the veins.

The action of digitalis on the heart is very noteworthy, and our knowledge of its influence on this organ whether healthy or diseased, is becoming daily more exact.

Drs. Fagge and Stephenson have published some interesting and important investigations concerning the influence of digitalis on the frog.

"Its effect on the frog is the production of irregularity of the heart's action, followed by complete stoppage of the pulsations, the ventricle remaining rigidly contracted and perfectly pale after it has ceased to beat, the muscular power of the animal at the time being unimpaired, and persisting as long as in frogs in which the circulation has been stopped by other means, such as ligature of the heart. The irregularity of the heart's action, which precedes its stoppage under the influence of the poison is peculiar. The rhythm is but little altered, and the beats are not necessarily diminished in number, as has been supposed. Sometimes, however, the ventricle makes only one pulsation for two of the auricles, the number of its contractions being therefore lessened by one half."

"More frequently the irregularity consists in one or more portions of the ventricle (especially the apex) becoming rigid, white, and contracted, while the remainder of the organ continues to dilate regularly. When the yielding portions are small, a peculiar appearance, as if the wall of the ventricle formed crimson pouches or protrusions, is produced."*

In these experiments the digitalis certainly did not weaken but strengthened the heart's contractions and at last tetanized this organ; at the same time the contractions were rendered peculiar and irregular.

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* These authorities point out that "upas antiar, helleborus viridis, and perhaps other species of helleborus, the Tanghinia venenifera, the dajaksch, the carroval, and scilla maritima influences the heart in the same way."

Dr. Fothergill finds "that first the contractions became somewhat quicker and more complete; then the distension became less complete, especially at the apex, which remained white, and firmly contracted. Here and there were little sections apparently belonging each to a separate cardiac ganglion which did not seem affected, and in the general contraction pouched out, contrasting in colour with the contracted and whiter portions."

Two other experimenters, Eulenberg and Ehrenhaus, have ascertained the influence of solutions of digitaline, applied directly to the frog's heart after its separation from the body, in order to ascertain if the effects of digitalis are due to its action on the pneumogastric nerve. When partly submerged in a solution of digitaline, composed of one fourth of a grain of the alkaloid to the ounce of water, the contractions of the still pulsating heart increased in force, but every now and then a pause occurred in its beat.

With a still weaker solution (gr. i. to ℥ viii.) the same phenomena were observed. The pulsations grew fewer and fewer, while the duration of each contraction was proportionately lengthened. The heart continued to pulsate two hours and a half.

These investigations show that digitaline strengthens the contractions of the heart, and prolongs the systole, while it does not at all shorten the time the heart usually continues to contract after its removal from the body.

Dr. Nunneley has made numerous observations on the action of digitaline on frogs. The following in his own words, is a summary of what he has observed.—

"The physiological action of digitaline on the heart of the frog would appear to be widely different from its therapeutical action on the dilated and weakened human heart in disease. In the former case the heart is thrown into violent and disorderly contractions, which quickly end in a cessation of movement; in the latter, clinical examination of the heart and pulse appear to show an increase of contractile power, and a restoration of its regular performance.

"1. The first visible effects on the heart occur a short time after the injection of a moderate dose under the skin of the frog, and consist in a diminished range of the heart's movements, whilst the organ itself appears somewhat shrunken. The most marked alteration, however, is a certain embarrassment and want of smoothness in the contractions, as if the separate muscular fibres acted with undue energy, but in an irregular manner, or as if there was a want of co-ordination in the contractions of the individual fibres.

"2. The heart does not contract with greater frequency after a dose of digitaline, and no change at all occurs in this respect until its action becomes embarrassed, when the frequency of pulsation is diminished, and does not again increase.

"3. The ventricular systole is lengthened, but it presents a very different appearance to the systole in health. The ventricle seems no longer to act as a single large muscle, but as if made up of numerous small ones, which contract energetically but in an irregular and disorderly way; hence there are projected bundles of contracted muscular fibres which give the ventricle a rough and uneven surface and an irregular outline. During the diastole the ventricle does not everywhere assume a red colour, but one or more red spots appear, as if the ventricle were so tightly compressed that only a small quantity of blood could enter it by chance. Sometimes a red spot is elevated a little above the general surface, forming a kind of pouch. These spots become smaller and smaller, until at last the ventricle is left very pale, strongly contracted, and motionless, while the auricles are distended with blood.

"4. The rhythm of the contraction of the three cavities is generally little interfered with. Two contractions of the auricles sometimes occur to one of the ventricles, but often there are also two ventricular contractions, one of them being very slight and transient.

"Sometimes, after the injection of a dose under the skin, the frog has paroxysms of gasping movements, in which it remains perfectly still, leaning on its fore-paws which are widely separated, and holding its head up, and opening its mouth widely. Whilst in this state, which lasts from about half a minute to a minute and a half, or more, the frog scarcely notices irritation of its skin, or shaking of the dish containing it, and the mucous membrane of the tongue and mouth are seen to be extremely pallid in consequence of the small quantity of blood sent from the heart. When the paroxysm has passed off, the frog jumps about with energy. It is worthy of remark that whilst the embarrassment to the action of the heart is continuous, the gasping movements are paroxysmal, as in human beings where the cardiac dyspnœa occurs in fits, whilst the condition of the heart remains constant. The posture and appearance of the frog are chiefly noticeable, however, from the vivid picture they present of extreme and urgent dyspnœa."

It thus appears that, in the main, all these experimenters agree as to the action of digitalis on the frog's heart.

Messrs. Bouley and Reynal in giving large doses to horses found the circulation became more rapid, the heart-beats more abrupt, their energy much increased and accompanied after a certain time with a vibratory thrill, with a decided metallic tinkling; and as poisoning went on a distinct bellows' murmur was heard, becoming more audible on exertion; the heart-beats then show a decided intermittence and the pulse is small, thready and intermittent.

In doses less rapidly fatal there is at first slight excitement of the heart, with a little quickening of its beats, then they soon grow less frequent and fall to 25 or 20 a minute. The cardiac sounds are more clearly heard, more distinct from each other than normally, and with a different rhythm, there being occasional intermissions occurring regularly, or irregularly, and after a time a vibratory thrill is detected, followed by a bellows' murmur. As death approaches the beats become rapid, 90, 100 or 141. Dr. Brunton, who has heard the blowing murmur several times, says it occurs in horses, dogs, and in the human subject, and that it is probably due to mitral or tricuspid regurgitation from irregular contraction of the columnæ carneæ.

Dr. Fothergill found that when introduced into the circulation digitalis contracted the heart of minnows till no cavity could be seen, the organ becoming hard and glistening like gristle; the auricle was distended and could not drive the blood into the firmly contracted ventricle; hence the blood regurgitated into the venous sinus behind, which, on being pricked, the auricle drove out the blood and became firmly contracted, showing that, in these animals at least, this agent affects the auricle in the same way as the ventricle. Dr. Fothergill likewise found that digitalis given to sparrows contracted the left ventricle, the right side of the heart being very distended and the lungs congested; showing that this drug affects either exclusively the left side or affects it earlier and more powerfully than the right side, otherwise the right cavities should become as contracted as the left.

Dr. Fothergill records likewise the following curious and important observations, showing the opposite action on the heart of digitalis to aconite under certain circumstances. On poisoning a frog with aconite the ventricle became gradually more and more distended, its contractions slower and more feeble, until each contraction drove only a small quantity of blood off the top of the distended ventricle, and at last the greatly distended heart ceased to beat; at this crisis he administered digitalis, and soon contractions at long intervals took place imperfectly, the gaps becoming shorter and shorter and the contractions more and more complete till the heart beat naturally. Then on poisoning a frog with digitalis he found that aconite acted but little on the heart and was incapable of dilating it.

Many modern writers as Handfield Jones, Fuller, Winogradoff, Traube, Brunton, Balthazar Foster, in opposition to the views formerly held, consider that digitalis strengthens the heart's contraction; for it strengthens a feeble dilated heart, and as we have seen the ventricles are found strongly contracted in frogs, minnows, sparrows, and occasionally in mammalia. In addition to this effect it produces irregular and disorderly action in frogs; different parts of the ventricle appearing to act without any relation to each other, and a similar disorderly action probably occurs in tne hearts of other animals.

Sometimes after a large dose the pulse, as we shall see, becomes very frequent and feeble, which does not show that the heart itself is weak, for at this very time the heart may be beating strongly. The weak pulse is due to dilatation of the arterioles, whereby the blood passes quickly and easily from the arteries into the veins. Traube and Brunton, however, evidently regard digitalis as a heart-tonic only when given in moderate doses, for as will be shown presently, they consider that large doses paralyse the nervous ganglia of the heart.

Boehm's experiments tend to confirm the view that digitalis strengthens the heart's action. The isolated heart of a frog was made to pump serum through a glass tube; on applying digitalis, the heart acted with greater force, but larger doses diminished its power. Finally the heart stopped with every drop of serum squeezed out of the ventricles. Each individual beat of the heart was greatly increased in strength, in some instances nearly doubled. The loss of power after large doses appeared to be due partly to the great slowing of the heart, partly to the incompleteness of the diastole and the consequent imperfect filling of the ventricles.

Blake, Brunton, Foster, and others find that digitalis sometimes considerably increases arterial tension. Digitalis injected into a vein causes the tension to reach its maximum in four to ten minutes, and this heightened blood-pressure Brunton attributes chiefly to contraction of the arterioles. Dr. Boehm finds as Traube has stated, that after section of the cervical spinal cord destroying communication between the arterioles and the vaso-motor centre, digitalis causes no rise in arterial pressure. Dr. Fothergill has seen the arterioles in the web of the frog's foot contract on the local application of digitalis; on the other hand, Dr. Nunneley carefully investigated the subject, and concludes that digitalis locally applied to the web of the frog's foot, produces no effect whatever in the calibre of the small arteries, nor when it is injected under the skin any alteration in their size, until the irregular and more or less persistent contractions of the ventricle diminish the blood-stream to which the arteries then to some extent adapt themselves. Dr. Boehm, too, has often examined the small arteries of the frog's mesentery, studying for hours the action of digitalis upon them, but has never found them affected by it. Dr. Brunton with the aid of Traube's modification of Ludwig's kymographion reinvestigated this question and he holds to his original conclusion, that digitalis causes contraction of the arterioles. For example, he paralysed a dog with morphia, inserted a canula into the crural artery, and then compared the curves indicating blood-pressure before and after the injection of digitalis. After the injection the pulse grew slower, and the mean blood-pressure increased, whilst the height of the wave due to each cardiac pulsation remained much the same; and the blood-pressure continued to rise, although the pulse grew slower and slower, and the oscillations of the mercurial column at each pulsation diminished in extent. The increase of blood-pressure may be due either to the heart at each pulsation propelling a greater quantity of blood into the aorta, or to the contraction of the arterioles lessening the facility of the blood-flow from the arteries through the capillaries, to the veins.

A study of the form of the pulse wave proves that the increased pressure is due to contraction of the arterioles, since a much longer time was occupied in the descent of the pulse wave after digitalis, showing that the blood passed more slowly out of the arteries into the veins. With heightened blood-pressure, the arterioles remaining unchanged, the blood would pass quicker into the veins and consequently the descending line of the pulse wave should occupy a shorter instead of a longer time.

A poisonous dose of digitalis after a time paralyses the arterioles, which therefore dilate, and the arterial tension falls.

According to Saunders, Jörg, Hutchinson, and others, digitalis, in moderate doses in the first instance, quickens the pulse, though other observers deny this effect. All, however, agree that moderate doses render the pulse less frequent, and that if the drug is pushed the pulse becomes irregular, very frequent and feeble; feeble, according to Brunton, owing to the paralysis of the arterioles, whence the blood passes more readily from the arteries into the veins; and quick and irregular as Traube apparently believes, owing to the previously stimulated vagi becoming paralysed.

Various and contradictory explanations have been advanced regarding the way digitalis affects the heart.

The following seem to be the leading phenomena requiring consideration:—

1. Increased contraction, ending in tetanic contraction of the ventricles, as evidenced in the case of frogs and many other animals.

2. The slowing of the heart's action in man and the higher animals, followed, after large doses, by very frequent and feeble pulse.

3. Irregular action of the heart.

4. Increased arterial tension.

It has been proved that moderate stimulation of the vagus slows the heart, but if the vagi are divided, it beats quickly tumultuously, and irregularly. We have just seen that in the higher animals, digitalis at first slows the heart, but that poisonous doses make the heart beat quickly and irregularly. These facts induced Traube to conclude that digitalis at first stimulates but afterwards paralyses the vagi; thus, he found that a moderate dose injected into the veins of dogs, greatly reduced the frequency of the pulse, but a larger dose increased it in one case from 32 to 160 beats, and in another case from 33 to 202 beats. He made seven further observations to discover if this effect were really exerted through the vagus. After slowing the pulse by digitalis, he cut the vagi, when the pulse at once became very frequent. Further, after dividing the vagi, the digitalis in most cases reduced the pulse very little. Subsequently it was shown that whilst stimulation of the vagus reduced the blood-pressure, digitalis greatly heightened it; proving that the effects of digitalis are not applicable without admitting the influence of the cardiac ganglia ("musculo-motory") as well as the vagi ("regulatory").* This led Traube to reinvestigate the question. After paralysing the vagi by the injection of woorari, to obviate the effects resulting from their section, and performing artificial respiration, he divided the vagi and injected infusion of digitalis into the veins and found that a great increase of the blood-pressure (arterial tension) took place; a result which led him to the conclusion that digitalis at first stimulates the vagi and the motor nervous ganglia of the heart itself, but afterwards paralyses both.

Dybkowsky and Pelekan maintain that digitalis acts solely through the regulating and musculo-motory (ganglia) apparatus of the heart itself, and not through the vagi, as the drug's influence is not affected by destruction of the medulla oblongata, by division of the vagi, nor by their paralysis with woorari. Eulenburgh and Ehrenhause have shown that digitalis will produce its effects through its action on the heart itself, for as we have seen, the heart's contractions are arrested when the lower third of the extirpated heart of a frog is placed in a strong digitaline solution, whilst a weaker solution renders the movements slow and intermittent. Brunton considers that Traube's experiments prove that digitalis likewise acts through the vagus, and that after division of the vagi, digitalis acts on the terminations of this nerve but less energetically than on the trunk, and consequently produces less effect than when the vagi are intact. Brunton believes that digitalis "acts on the regulating apparatus of the heart chiefly through the vagus, thus causing slowing of the heart, and stimulates the musculo-motory apparatus (ganglia and nerves of the heart), causing increased force of the cardiac contractions. This primary stimulation then gives way to paralysis at first partial then complete." Subsequent observations led him to conclude that digitalis slows the heart in part by its contracting influence on the arterioles, thus heightening arterial pressure, and not altogether by direct influence on the vagus, for after slowing the heart-beats by the drug he administered nitrite of amyl, and thus induced dilatation of the arterioles and diminution of the blood-pressure. Whenever the blood-pressure fell after the inhalation of amyl, he found that the pulse became quick. On the other hand, Traube finds that after cutting the cervical spinal cord of a frog, thus separating the arterioles from the vaso-motor centre, digitalis induces marked slowing of the pulse simultaneously with great diminution of arterial pressure, this proving, as he believes, that this slowing is not due to increased arterial pressure. Dr. Böhm likewise finds that after section of the cervical spinal cord of rabbits, digitalis produces no increase of arterial pressure, showing that this drug affects the arteries through the vaso-motor centre.

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* But this increased arterial tension is, in large part due to the contraction of the arterioles by digitalis.

Brunton, Foster, and others, are led to conclude from sphygmographic observations, that in the healthy human subject digitalis, while diminishing the frequency of the heart's beats, increases the force of each beat, and augments arterial tension.

We can conceive that in a given disease digitalis may afford relief in one of the four following ways:—

I. By strengthening the action of a weak heart.

II. By reducing the strength of the beats of a heart acting too powerfully.

III. By lessening the frequency of the heart's beats.

IV. By correcting irregular action of the heart.

It is possible, that in certain affections, digitalis may give relief through each of these effects, or through one or more of them in combination. Further, it is a question of interest whether digitalis affects both sides of the heart or the left only, and whether it affects both auricles and ventricles, and if so, whether in an equal degree. These questions cannot be satisfactorily solved, but from the recorded experiments on animals; and from the fact that digitalis equally reduces the frequency of the contractions of both cavities, it is probable that it affects the whole heart, but especially the ventricles.

Dr. Balthazar Foster ascribes the effects of digitalis on most diseases of the heart to the reduction in the frequency of its beats, and explains the influence of the drug in certain cardiac diseases in the following manner:—In most cases of aortic regurgitation it is well known that digitalis does harm by slowing the heart and giving more time for the blood to regurgitate into the ventricle, and by increasing arterial tension digitalis correspondingly increases the regurgitation and thus greatly aggravates the severity of the symptoms. In mitral obstructive disease it is serviceable, for "by slowing the action of the heart the period of time during which the blood from the distended auricle can flow into the ventricle is increased, and as the extra time allows more blood to pass through the narrowed mitral orifice before the final effort of the auricle is made, that effort is made on a smaller quantity of blood, and is consequently more effective." He thinks that digitalis also strengthens the contraction of the auricle.

I believe that we obtain better indications respecting the advisability of using digitalis by considering the totality of the symptoms rather than by confining the attention simply to the nature of the valvular affection, and therefore I will fully indicate the heart diseases in which this drug will prove useful, and those in which it will be found of little or no use.

Digitalis will be found of eminent service to a patient presenting the following symptoms and physical signs:—there is dropsy, which may be extensive; the breathing in the earlier stages of this condition is much distressed periodically and especially at night; but when the disease reaches its worst stage the breathing is continuously bad, although it becomes paroxysmally worse. The patient cannot lie down in bed,* and is perhaps obliged to sit in a chair with the head either thrown back, or more rarely leaning forward on the bed or some other support. The jugular veins are distended, the face is dusky and livid, and the pulse very frequent, feeble, fluttering, and irregular. The urine is very scanty, high-coloured, and deposits copiously on cooling. The heart is seen and felt to beat over a too extensive area; and the chief impulse is sometimes at one spot of the chest and sometimes at another. The impulse is undulating, and the beating very irregular and intermittent. The physical examination betrays great dilatation of the left ventricle with often a not inconsiderable amount of hypertrophy. A murmur is ordinarily heard having the character of that produced by mitral regurgitant disease, and also there may be disease of the aortic valves.

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* These, and other sufferers from diseases of the heart, who often become much exhausted through inability to sleep, may obtain relief from the dyspnœa, and sleep more or less refreshing, by the hypodermic injection of small quantities of morphia (one-sixth or one-twelfth of a grain) without fear of any disagreeable consequences.

In such cases, Dr. Foster ascribes the symptoms to mitral obstruction, and he considers that digitalis affords relief by slowing the heart's beats; but this view fails to explain those instances where, after digitalis has relieved the patients, the drug may be discontinued for a long time without a return of the symptoms. Dr. Foster says, that digitalis strengthens the heart, thus increasing arterial recoil, so promoting its own nourishment, and in this way permanently strengthening the heart; but this hypothesis fails to throw light on those cases where, after two or three days, the medicine may be discontinued without return of the symptoms; in so short a time the heart can hardly have become permanently strengthened by increased nutrition.

A case presenting these symptoms and physical signs will generally respond quickly to digitalis, if it be given in the way here set forth. In all treatment, the object should be to obtain the greatest therapeutic effects with the smallest possible dose, a condition particularly important with a powerful drug like digitalis; large doses sometimes appear to increase the heart's embarrassment, and relief comes only when the dose is diminished. It is highly important to give a dose no larger than is necessary, since the patient may require to take it for a long period; in a case like that just described, the patient after a time becomes accustomed to the medicine, and the dose which at first afforded relief seems partially to lose its effect and requires augmentation; but this could be done only with the greatest caution, and even then with some hazard, if, in the first instance, the maximum quantity had been given.

I believe that with digitalis the formula has much to do with the success of the drug. The fresh and well made infusion generally gives far better results than the tincture. It is advisable to begin with a drachm of the infusion twice, or not more than three times a day, and in many instances this quantity will suffice. The effects on the pulse, the urine, and the dropsy, are to be carefully watched. When the drug is properly administered, the pulse grows considerably stronger, more regular, and much slower, till in very many cases, all irregularity ceases, and the pulse becomes natural in frequency and rhythm. At the same time the urine, which previously may not have amounted to more than half a pint in the twenty-four hours, increases to one, two, four, or even eight pints a day, and in proportion to this increased flow, the dropsy diminishes till it finally disappears. Should the influence of the drug be small or imperceptible, the quantity may eventually be increased; but it must be remembered that the efficacy of digitalis may not become apparent for three or four days. A drachm may be given every three or four hours, as circumstances indicate, or one drachm may be given in the morning, two in the middle of the day, and two at night; should the symptoms resist this additional dose, another augmentation must be made in a few days. A small dose often succeeds admirably at first in removing much of the dropsy, but fails to effect all that is desired; the dose should then be gradually increased.*

When a patient with the foregoing symptoms dies, the post-mortem examination generally reveals great dilatation of the left ventricle, with much true hypertrophy of its walls. Sometimes there is incompetence of the aortic or mitral valves, or of both; but it sometimes happens that both these sets of valves are healthy and admit of no regurgitation when tested with water, although a murmur of a mitral character had existed during life.

Digitalis will be found especially useful when there is much dilatation and hypertrophy of the left ventricle without valvular disease, although a mitral murmur may have been heard during life; but in many cases it is at present, unfortunately, impossible to decide before death whether or not there is mitral disease.

Eminent authorities have asserted that in aortic disease digitalis will embarrass the heart still further, and increase the difficulty of breathing, and indeed is worse than useless; but a prolonged and careful investigation of this question has convinced me, that in a case presenting the physical signs and symptoms above described, the existence of aortic disease, whether obstructive or regurgitant, or both, does not in any way contra-indicate the employment of digitalis.

The irregularity of the pulse is the capital indication of the necessity of giving digitalis.

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* The cases we are now treating of, require in most instances free alcoholic stimulation, and the best agent, on account of its diuretic action, is gin.

Earlier stages of the foregoing condition are not unfrequently met with, when the symptoms, though troublesome, have not yet become very severe. These forms sometimes occur in children some time after an attack of rheumatic fever. The strong and heaving impulse of the left ventricle, strong enough sometimes to shake the patient, gives evidence of great dilatation and hypertrophy; and there is generally a systolic apex murmur (mitral), with perhaps systolic apex thrill. The patient at first is troubled only with palpitation on exertion; but after a variable time, perhaps many years, paroxysms of palpitation set in, accompanied by urgent dyspnœa, and the attacks may recur so often, that the child, unable to lie down at night, is obliged to be propped up with pillows. At a further stage the dyspnœa is continuous, but becomes paroxysmally worse, and the child is unable either night or day to assume a horizontal position. In all these stages the pulse is ordinarily quite regular, but is generally very frequent and feeble, although at the same time the heart throbs violently against the chest. There is no dropsy, or it is slight and transient, appearing for a few days, and then passing away, till for some reason the heart again becomes embarrassed.

Digitalis will often quell the tumultuous, strongly beating heart, strengthen the pulse, at the same time reduce its frequency, and improve the patient in every respect. It must be given till the pulse falls to 60 or 70 beats. In these cases very large doses are sometimes required, even two grains of the powdered leaf every three hours.

In cases such as we have just described, two important circumstances may be frequently observed; the pulse may be very weak and feeble, while the heart contracts with unnatural strength; and while the digitalis strengthens the pulse, it subdues the unnatural force of the heart's beats.

The first circumstance is of great importance, as in the cases now treated of it is commonly thought that the weak pulse indicates a correspondingly weak heart, whence it is concluded that, as digitalis is eminently suitable for the cases in question, it is useful when the heart is feeble,—a conclusion certainly errroneous; for, as we have said, while the pulse is very weak, the heart can be felt to strike the chest with considerably increased force; and further, when these patients die, the left ventricle is found largely dilated it is true, but also greatly hypertrophied.

This want of correspondence between the pulse's strength and the heart's contraction, becomes still more apparent when a patient thus affected is seized with an attack of palpitation. The heart then sometimes beats with strength sufficient to make its movements visible through the clothes, or even to shake the bed, yet the pulse at the same time is very small and feeble. Where this discrepancy between the vigour of the heart's contractions and the strength of the pulse is permanent, it would appear as though a patient were troubled with a perpetual palpitation, which, however, becomes paroxysmally worse. Digitalis will often correct this discrepancy between the pulse and the heart, which may be viewed as a form of irregularity on the part of the heart; hence, while under its influence the heart's action becomes quieter, the pulse grows stronger, as well as slower, affording one illustration of the power of digitalis to control a heart contracting too strongly.

An early stage of the severe disease just depicted may also be witnessed in older people, in whom there is much irregularity of the heart's action, with a pulse irregular and intermittent, neither quick nor very weak and with no alteration in the size of the organ. A mitral murmur may very generally be detected, and perhaps an apex systolic thrill. These patients may suffer from constant dyspnœa and from attacks of palpitation, during which the embarrassment of the breathing is much aggravated. There is no dropsy nor lividity of the skin, and the urine is secreted in natural quantity. Here digitalis will give complete relief, quieting the palpitations, removing the dyspnœa, and regulating the pulse. The disease may persist for years in this form, requiring the use of digitalis for months or years sometimes in very large doses, and may even then fail to restore perfect cardiac action, the irregularity becoming marked on exertion; yet digitalis will remove all or most of the symptoms though a little irregularity may remain.

The existence of aortic valvular disease in any of the milder (as also in the severer) forms, is not to be considered a prohibitory indication to the administration of digitalis.

An important question is, how long can digitalis afford relief and preserve life? As might be expected, this will depend on the more or less advanced stage of the disease. In its earliest stages the relief may be so complete as to permit the discontinuance of the medicine, and the patient may remain relieved for many months or many years; but generally occasional evidence of the symptoms recur, to be removed again and again by a fresh recourse to digitalis. Thus life may be greatly prolonged and made useful, although the sufferer is unfit for very arduous work. Even when dropsy has appeared, and sometimes even when it is extensive, digitalis will often give great and permanent relief; but in most instances where the disease, having lasted for some time, has much advanced, the relief—although it may be to the extent of getting rid of the dropsy and dyspnœa—is of short duration, and the disease, as it were, over-rides the medicine and progresses in spite of it. It is of bad augury if a considerable dose is required to mitigate the symptoms, or when it is necessary to give the drug in increasing doses to maintain the ground at first gained.

If no dropsy is present the digitalis will not notably increase the quantity of urine, indeed will not act as a diuretic; for usually where there is no dropsy, the urine is excreted in natural quantity.

The disease just described appears to run the following course:—At first, from valvular disease, or from some at present unexplained cause, the left ventricle dilates, becoming hypertrophied in the process, and when the dilatation and hypertrophy have progressed in some degree, the heart's impulse becomes strong and heaving, and is felt over an extensive area of the chest, while the patient, at first only on exertion, becomes affected with attacks of palpitation and dyspnœa.

Next as the disease advances, either gradually or suddenly, the impulse becomes still stronger, more extensive, more heaving, with very frequent contractions. The breathing simultaneously becomes permanently difficult, and with each attack of palpitation is paroxysmally worse—so bad, indeed, as to give rise to the idea that the patient cannot live through it. In this stage the pulse is frequent, small, weak, and altogether disproportionate in strength to the strongly contracting, heaving, tumultuously acting, left ventricle.* To the foregoing symptoms as the disease advances are added irregularity of the heart's action and irregularity of the pulse. Notwithstanding this formidable array of symptoms and physical signs, there is at first neither fulness nor pulsation of the jugular veins, nor any lividity of the face, nor dropsy; but with the further inroad of the malady these symptoms arise, and are probably produced in the following way:—In consequence of the irregular action of the walls of the heart and its columnæ carneæ, the mitral valves become incompetent and permit regurgitation. There may also be disease and incompetency of the mitral valves with permanent regurgitation from the ventricle to the auricle, which regurgitation, the irregular action of the heart will increase. This regurgitation causing considerable obstruction to the passage of the blood through the lungs, the right side of the heart becomes distended and its valves in their turn become incompetent, leading to regurgitation into the veins, to general dropsy, and to lividity of the skin.

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* This over-strong action of the left ventricle digitalis controls, thus affording an instance of its efficacy in certain cases of hypertrophied and too-powerfully acting heart.

When the disease has reached its worst stage, the heart's action is so embarrassed that, although its walls are hypertrophied, it strikes with each beat feebly against the chest, and its impulse may be scarcely perceptible, whilst the pulse is frequent, feeble, irregular, and intermittent.

In some cases, and especially with children, the disease may advance to a great extent without producing any irregularity of the heart's action, though with other cases irregularity occurs early.

After death we find that the left ventricle is very considerably dilated, and very greatly hypertrophied. The mitral often, and not unfrequently the aortic valves, are more or less diseased, admitting of a variable amount of regurgitation. These statements are founded on post-mortem evidence.

Digitalis in this form of heart disease will be found of signal service.

I suggest the following explanation of its action:—By restoring order to the heart's movements, the regurgitation caused by the irregular action of the columnæ carneæ is obviated, and regurgitation from the left ventricle to the auricle, and thence through the lungs to the right side of the heart, is prevented. If this be the true explanation, then digitalis will remove the symptoms completely only when the mitral regurgitation is dynamic, and will fail to remove those dependent on organic disease of the mitral valves; and where, as frequently happens, in addition to irregularity of the heart's action, there is organic disease of the mitral valves admitting of regurgitation, the digitalis, by quelling the irregularity, will remove so much of the dropsy and concomitant symptoms as are referable to this condition, but will leave unaffected the residue of the dropsy and that share of the symptoms dependent on the structural valvular disease. This view explains the fact that digitalis is generally less useful in the cardiac dropsy of children than in that of adults, for in children we rarely meet with irregular action of the heart, the symptoms with them being generally referable to serious disease of the mitral valves.

The truth of this statement may be verified by cases which unfortunately too often occur. A patient with dropsy, and with symptoms and physical signs like those just described, derives partial benefit from digitalis, which removes much of the dropsy and dyspnœa, but fails to give complete relief. There is found after death much disease of the mitral valve permitting regurgitation, and the left auricle is in consequence much distended. Such condition of the mitral valves the digitalis of course could not remove, but that share of the dropsy and of the other symptoms produced by the irregular action of the heart the digitalis will remove. The truth of these statements may be verified by post-mortem examination, combined with clinical observation. Such testing investigations will show that digitalis is useful generally in proportion to the degree in which the dropsy, etc., are due to irregular action of the heart and are independent of organic disease of the mitral valves.

It must be admitted, however, that sometimes the foregoing explanation altogether fails: thus, we meet sometimes with cases of which the following is a type. A patient, generally a child, suffers from mitral regurgitant and obstructive disease, with ventricular dilatation, but chiefly on the right side. There is unintermitting inability to lie down, paroxysms of severe palpitation lasting hours or days, with a pulse at these times very frequent, but always regular. Dropsy sets in; digitalis checks the palpitation and removes completely the water-logged condition by greatly augmenting the kidney secretion. In this condition, sometimes better and sometimes worse, the patient remains perhaps for years, then the pulse becomes irregular but without any increase in the severity of the symptoms. The relapses from time to time recur, promptly giving way on each occasion to digitalis, as soon as it has greatly lessened the frequency of the pulse. It also regulates the pulse, but in these cases as we shall presently see, the improvement is not due to this effect. After death the mitral orifice is found much contracted, the valves united, leaving only a small circular opening; indeed so extreme is the diseased condition of the valves that the columnæ carneæ could not possibly act on them, so that any irregularity in the action of the columnæ could not increase regurgitation, a condition which makes it evident why no aggravation of the symptoms took place on the occurrence of irregular action of the heart. The post-mortem shows that the chief disease is mitral obstruction. Now, in such a case digitalis could have no beneficial influence on irregular action, for it removes the symptoms before the occurrence of irregularity; and irregular action of the columnæ carneæ, as we have seen, could not increase the regurgitation: we are then constrained to assume that digitalis acts in the way suggested by Dr. Foster, either by strengthening the auricle or by slowing the heart. There are, however, difficulties in accepting either view, for after a few days' administration of digitalis, and as soon as it has considerably reduced the pulse's frequency (a circumstance much in favour of Dr. Foster's view), the digitalis may then be discontinued and the patient will remain for weeks or months without a recurrence of the symptoms. Yet the mechanical impediment to the passage of the blood from the auricle to the ventricle still remains, and we should expect that the tonic or slowing influence of the digitalis must be kept up, unless it be that the auricle becomes temporarily much distended, and thus weakened, and the tonic or slowing action of the digitalis removes this embarrassing distention.

Many authors believe, and Dr. Fothergill has recently espoused the view, that the good effects of digitalis in the foregoing diseases are owing to its strengthening the contractions of the heart. Very likely digitalis does act as a tonic, and it appears to be serviceable in certain instances where from exertion or other causes the heart becoming embarrassed, and perhaps, as Dr. Fothergill supposes, the left ventricle becoming distended, severe symptoms are suddenly produced.

I cannot help thinking, however, that the tonic theory regarding digitalis, fails in most instances to explain its usefulness in heart disease. Admitting that digitalis strengthens the heart it seems to me that in this respect the clinical evidence is very small as to its efficacy.

1. Thus in aortic disease when the left ventricle is weak and unable to overcome the obstruction offered by the diseased aortic valves, the good effects of the drug are very slight, and indeed in my experience, *nil*.

2. Digitalis is not only useless but harmful in fatty and other degenerations of the left ventricle.

3. In obstruction to the circulation in the lungs, from emphysema or from extensive retraction due to pleurisy, (especially if the other lung become emphysematous), causing tricuspid regurgitation, digitalis appears to have little or no strengthening effect on the right ventricle in enabling it to overcome the lung obstruction.

4. In many of the cases most successfully treated by digitalis, the heart is not weak, but, on the contrary, is felt to beat with excessive force, and after death the left ventricle is found well nourished and much hypertrophied as well as dilated.

5. The efficacy of digitalis is most decided in cases where the heart acts irregularly and not where it simply acts weakly.

It is said that irregularity is a sign of weakness, (of the muscular or nervous structure?) and that the tonic virtue of digitalis removes this condition. But firstly, over and over again, we meet with great cardiac weakness without irregularity; secondly, we may have much irregularity without weakness of the heart's impulse or the pulse; and thirdly, we find the heart well nourished and hypertrophied in cases in which digitalis proves of marked service; the irregularity being the only sign of weakness; it is indeed, a strong-acting, well-nourished heart, misapplying its force through imperfect co-ordination.

Moreover, in estimating the effect of digitalis on the heart, we must be careful to discriminate its influence on that organ, from its influence on the pulse. Under the influence of digitalis the pulse, no doubt, grows fuller and less compressible; but it must be borne in mind that digitalis slows the heart, and therefore, if the heart does only the same amount of work each beat must be stronger: for instance, if we reduce the pulse from 120 to 60, the heart, to do an equal amount of work must, with each beat, pump double the quantity of blood, and thus each beat will feel stronger. Again, digitalis contracts the arterioles, thus increasing arterial tension and rendering the pulse larger and less compressible.

In the heart disease of children with regular pulse, it is difficult to explain the good effects of digitalis by its influence in regulating an irregularly acting heart; but I think the difficulty is still greater in ascribing the good results to the tonic action of digitalis. Dr. Fothergill holds, that in these cases the left ventricle is weak and becomes distended, being too feeble to empty itself, and that digitalis strengthens the left ventricle, which then contracts fully, empties itself, and the dilatation diminishes. The pulse, it is true, is very feeble and frequent; but at the same time the heart beats forcibly and even violently enough to shake the patient. What prevents this powerfully acting ventricle from emptying itself, or at all events, propelling enough blood to produce a full instead of a very weak pulse? And can digitalis be required as a tonic for a heart beating already with such undue force, which after death is found hypertrophied and well nourished, there being no obstruction to the circulation from the left side? In these cases, with a very feeble pulse, we find a powerfully acting heart misapplying its force. This misappropriation of force may be due to want of co-ordinated action—a form of irregularity amenable to digitalis. Certainly digitalis prevents this waste of heart-power, for whilst this drug notably strengthens the pulse, the heart's action becomes much weaker, so that a far less powerful ventricular contraction propels more blood. It may be objected that the strong impulse is due, not to the left but to the right ventricle; that from mitral regurgitant or obstructive disease causing impediment to the circulation through the lungs, the right side becomes unduly distended and contracts with great force. This explanation, however, fails entirely in many cases where the physical signs and post-mortem examination prove that the impulse was mainly due to a hypertrophied, dilated left ventricle. The strong cardiac impulse is sometimes, no doubt, due to the right ventricle, and, when the impediment to the free circulation depends on mitral obstructive disease, digitalis probably acts beneficially in the way explained by Dr. B. Foster.

Digitalis is often very useful in cases of the following kind which we sometimes meet with:—A patient, who has been, perhaps, troubled with slight palpitation of the heart for some years, on catching a cold is attacked with bronchitis, and finds in consequence much increase of the palpitations, which in their turn excite severe paroxysms of dyspnœa. The heart may appear healthy, or there may be only a slight mitral murmur. In such a case digitalis quells the palpitations and calms the breathing.

This medicine, however, leaves the bronchitis untouched, except that by easing the breathing it indirectly assists expectoration, and by the same means enables the patient to obtain refreshing sleep. In this indirect way digitalis may benefit the bronchitis, but the medicine here acts on the heart; and if with bronchitis there is much palpitation or irregularity of the pulse, this remedy is indicated. But sometimes a very violent fit of palpitation yields more promptly to one or two drops of aconite given every quarter of an hour.

M. Jaccoud teaches, that diminished cardiac energy and arterial pressure indicate the administration of digitalis, and that when the energy of the heart and the arterial pressure are augmented, it is contra-indicated. Digitalis and caffein, he says, stimulate the heart and give tone to the blood-vessels.

Da Costa strongly recommend digitalis in the condition termed by him "irritable heart." This disease occurs frequently among soldiers and may come on suddenly or gradually with proneness to fatigue, palpitation and dizziness. It is characterized by pain, generally persistent, but also paroxysmally intensified, lacerating, or more rarely burning or tearing, increased by exertion and situated most frequently over the apex of the heart, sometimes radiating in all directions and shooting down the left arm, and accompanied by hyperæsthesia of the cardiac region, increased by each attack of palpitation. The patient complains also of palpitation varying in frequency and severity, occurring at all times of the day and accompanied by much distress and pain. The palpitation is generally brought on by exertion, although it may occur while in bed. These attacks are accompanied by dull headache, giddiness, and dimness of sight. The violent seizures may even produce insensibility. The sleep is much broken and troubled by disagreeable dreams and the patient usually cannot lie on the left side. The pulse is rapid, varying from 100 to 140 per minute, small, compressible, and sometimes jerking, often irregular in force and rhythm,—always remarkably affected by posture, being very frequent while standing, much slower while lying down, the difference amounting to from 30 to 40 beats per minute. Palpitation greatly increases the frequency, in one instance to the extent of 192 beats per minute. The respirations are but little hurried, varying from 24 to 34, and the patient complains of oppressed breathing rendered worse by an attack of palpitation. The impulse of the heart is extended, but is "quick, abrupt, or jerking," and the heart may beat irregularly. The first sound is deficient in volume, "feeble or short and valvular, like the second sound." Murmurs, as a rule, are absent. This condition is produced by overwork, and fatigue, and is fostered by depressing influences. It commonly leads to hypertrophy, when of course the physical signs are modified. When the heart is not hypertrophied, Da Costa found that tincture of digitalis in ten minim doses thrice daily quieted the excited organ, reduced the frequency of and often strengthened the pulse, and rectified irregular cardiac action. If much hypertrophy existed, then digitalis proved less serviceable and sometimes failed to give any relief; but here, aconite in three to six minim doses was very useful; though in purely nervous cases this remedy was not only useless but often even increased the frequency of the pulse. In much irritability with slight hypertrophy a combination of digitalis and aconite did good. Belladonna was useful in cases accompanied by irregularity of the pulse, but proved of little service in other cases, modifying but little the frequency of the pulse. It was of no service in cases complicated with hypertrophy. He often continued the digitalis for months without producing any toxic effects. In addition to the foregoing treatment Da Costa employed rest in the recumbent posture.

In the cases of cardiac dropsy, previously described, so much benefited by digitalis, it appears to me that in these a condition existed closely related to, if not identical with, that set forth by Da Costa under the term "irritable heart," but in a more advanced form; that this condition is more or less associated with a variable amount of valvular disease, mostly but not necessarily of the mitral valves, and that it is this peculiar "irritable" state, probably due to some affection of the co-ordinating nerves of the heart, that digitalis controls and benefits so effectually. Hence, if all or the major part of the symptoms are due simply to irritability of the heart, digitalis will cure either all or most of the symptoms; but if the symptoms are mainly or entirely due to valvular disease then digitalis is far less serviceable.

Digitalis is often very useful in pure hypertrophy of the heart which may be due to valvular disease, especially of the aortic valves or to Bright's disease, or to excessive muscular exertion. In all these forms, digitalis affords relief by quelling the attacks of palpitation. In aortic disease the hypertrophy is compensatory, hence in most cases, especially of aortic obstruction, no treatment is needed for the hypertrophy itself.

B. Foster recommends digitalis in aortic regurgitant disease when there is more compensatory hypertrophy than the impediment to the circulation requires, indicated by violent action of the heart, bounding vibratory arteries, visible all over the body, almost constant headache, flushed face and noises in the ears. It must be borne in mind, however, that these symptoms occur only in severe cases and that digitalis is useful where the symptoms are much less pronounced. Dr. Balthazar Foster points out that in these instances the action of the medicine must be watched, for too large a dose may induce alarming prostration with aggravation of the palpitations, effects which he attributes to the slowing of the heart by digitalis and the increase of the regurgitation at each diastole; but although this explanation may be partially, it is not wholly true, for the same consequences follow too large a dose of digitalis in other forms of hypertrophy unassociated with valvular disease. In cases like these, two to five minims of the tincture is as much as can be tolerated. For the most part they are best treated by one to three drops of tincture of aconite given thrice daily.

Digitalis exerts little or no control over certain forms of heart disease which may produce dropsy.

General dropsy dependent on heart disease is in some instances produced by the lungs becoming degenerated, then emphysematous, thus obstructing the free circulation of the blood from the right to the left side of the heart, whilst to meet and overcome this condition the right ventricle grows hypertrophied, but only to an extent sufficient to meet the obstruction offered to the circulation; and, unlike the healthy heart, little reserve power is left in it, so that on the occurrence of any sudden access to the obstruction of the circulation through the lungs, the right ventricle becomes unequal to the task thrust upon it. This happens frequently in an attack of bronchitis, when the blood, unable to pass readily through the lungs, accumulates in the right cavities of the heart, overloads them to distention, till the tricuspid valves become incompetent, and permit of regurgitation from the ventricle to the auricle, and thence into the veins, when, if there is considerable obstruction in the lungs, dropsy will ensue; and the dropsy will vary with the amount of bronchitis; as this increases or declines, so does the dropsy augment or diminish. If the distention of the right cavities lasts a considerable time, then, on the subsidence of the bronchitis, the cavities fail to regain their natural size and the tricuspid incompetency and the dropsy become permanent.

Digitalis here appears to possess very slight, if any, power to strengthen the heart to overcome the obstruction in the lungs, unless indeed the heart acts irregularly. A considerable degree of cardiac irregularity, even without either hypertrophy or dilatation of the left heart or disease of its valves adds to the difficulty of the breathing, diminishes the quantity of urine and produces dropsy, or increases it if already present. Digitalis will remove this irregularity together with so much of the symptoms as are referable to this cause.

A case like the following will exemplify the inefficiency of digitalis to strengthen the heart, and thus enable it to overcome any obstruction offered in the lungs. A patient of middle or advanced age, with irregularly acting heart, much dilated on the left side, and who has consequently suffered from dropsy, dyspnœa, etc., symptoms which digitalis has thoroughly removed, will on catching cold, and on the occurrence of bronchitis, suffer from dyspnœa, lividity, dropsy, etc. Here it would naturally be inferred that digitalis, having previously removed these identical symptoms, would again give relief. But this is not necessarily the case, and a nice discrimination must be made of the circumstances producing the return of dropsy, etc.; for instance, if there is much emphysema the relapse is not uncommonly due solely to the obstruction in the lungs caused by the bronchitis and emphysema, and is in no way dependent on any effect the bronchitis has produced on the dilated left ventricle. Digitalis here can do no good, but remedies are needed to control the bronchitis. If, however, as is not unfrequent, the bronchitis affects the dilated left ventricle, and brings back the conditions which existed when the digitalis erewhile did so much good, then it will again afford relief. In deciding the question whether digitalis should be given or not, attention must be directed to whether on the return of the dropsy, etc., fits of palpitation come on, with attacks of dyspnœa, and if the heart is excited to beat irregularly, in which case digitalis is required; but, on the other hand, although there is hurried breathing and a very quick pulse, yet if the symptoms just mentioned are absent, the patient will derive no benefit from digitalis.

Digitalis does no good in other serious diseases of the heart that induce dropsy; and indeed, unless care is taken, it may do much harm. For instance, a patient in the prime of life, and it may be without any rheumatic fever antecedents, has suffered for some time, perhaps for years, from palpitation after exertion. Auscultation reveals an aortic obstructive or regurgitant murmur, or both combined. To overcome the obstruction to the circulation occasioned by the aortic valvular disease, the heart becomes hypertrophied, and this compensation saves the patient for a time from any troublesome symptoms except some palpitations; but after a variable time serious symptoms arise, which generally increase rapidly in severity, and in the course of a few weeks or months the patient dies. The aggravation of the disease is denoted by paroxysms of palpitation, accompanied by urgent dyspnœa. The attacks may be occasioned by the slightest exertion, or may occur without any such provocation.

The dyspnœa soon becomes constant as well as paroxysmal, and about this time dropsy invades the legs, and rapidly extends till it involves the greater part of the body, and is often in excess in the pleural or peritoneal cavities. During the whole progress of the disease and to its termination in death, *both heart and pulse beat regularly and without any intermissions*, and the pulse often manifests the characters significant of aortic regurgitant disease. There is no lividity of the skin, but, on the contrary, it is strikingly pale and waxy looking; nor is there any fulness or regurgitation into the jugular veins. In addition to the aortic murmurs, a murmur may exist having the character of mitral regurgitation, but after death the mitral valves are generally found healthy and competent.

The pathological history of such patients appears to be that disease of the aortic valves induces hypertrophy of the left ventricle, thus enabling it to overcome the obstacle to the circulation offered by the valvular affection. While the compensating hypertrophy keeps pace with the disease, the patient is troubled only by the increased action of the hypertrophied heart, and he may live many years in this condition, little incapacitated for work. Continuing in this state for a variable time, the disease of the heart may at last produce serious and fatal symptoms, in the following ways, the effect on the circulation in each case being the same.

I. In one instance the disease in the aortic valves advances with great rapidity, so quickly indeed as to make it impossible for the left ventricle to hypertrophy sufficiently to combat the obstruction to the circulation offered by the aortic disease, whence ensues much derangement of the circulation, on which depends the serious symptoms just detailed.

II. In the other instance the disease of the aortic valves remains either stationary or progresses very slowly, but the left ventricle undergoes degeneration, sometimes with great rapidity, and becomes consequently too enfeebled to meet the increased work thrust upon it by the diseased aortic valves, whence arises disturbance of the circulation, the setting in of dyspnœa, palpitations, &c., as described in the previous case.*

In such cases digitalis will do little or no good. Brunton points out that by contracting the arterioles it causes increased obstruction to the circulation, thus throwing more work on the weakened and inefficient heart, and hence he explains the bad effects of digitalis in fatty heart. Sometimes, indeed, it appears to control in a slight degree palpitation and the paroxysms of dyspnœa; but it happens, not unfrequently, that the pulse grows both feeble and intermittent, an effect I have witnessed in a case of great degeneration of the substance of the left ventricle. When it does relieve by controlling dyspnœa and palpitation, it effects no permanent benefit, for the other symptoms such as dropsy, &c., gradually increase and the patient dies, digitalis apparently failing to prolong his life.

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* It is commonly asserted that dropsy associated with aortic disease is due to tricuspid regurgitation, that the aortic disease leads to hypertrophy of the left ventricle, and that the consequent increased strain on the mitral valves from the strong contraction of the left ventricle produces disease and incompetency of the mitral valves, with mitral regurgitation, congestion of the lungs, distension of the right ventricle, and tricuspid regurgitation with dropsy. Mitral disease no doubt frequently follows aortic, but in most of these cases the dropsy seems to me independent of the mitral disease. For in many cases there is no mitral murmur during life, nor apparent mitral disease found after death, though it may be said the left ventricle becomes distended, and thus mitral regurgitation is produced when no pathological evidence of this will be found after death. But ordinarily the appearance of the patient with aortic dropsy, is very dissimilar from that of a patient with tricuspid regurgitation; with aortic dropsy there is waxy pallor and no fulness of the jugular veins. Thus in a case presenting such appearances without a mitral murmur during life, and with no disease of the mitral valve detectible after death, we must admit that simple aortic disease with a weak left ventricle, may produce dropsy without tricuspid regurgitation, nay even where mitral disease exists, the marked waxy pallor and the absence of fulness of the jugular veins would show that in most instances the dropsy is not due to tricuspid regurgitation.

Before concluding these remarks, I ought to add that the administration of digitalis must always to some extent be experimental. It is easier to tell in what cases it will fail than in what cases it will succeed. It is impossible to know how much benefit it will confer or how long the benefit will last. Neither is it easy to tell the dose that may be required. Thus we meet with cases in all respects apparently identical, in one case digitalis will wonderfully improve, whilst in others it does little or no good, or may even do harm by weakening the pulse and rendering it still more irregular. When digitalis works but little good, it appears to me that the symptoms are mainly due to the valvular affection, not much to the irregularity; where it does marked harm, the left ventricle is degenerated.

Digitalis is a diuretic, acting directly on the kidneys as well as indirectly through its influence on the heart, and is therefore useful in some cases of Bright's disease. When it lessens the cardiac disease its diuretic effects are astonishing. I have been led to believe that the diuretic action of digitalis is limited by the dropsy, for when dropsy disappears the remedy no longer causes an increased secretion of urine. This also is the case with some other diuretics.

How does digitalis in certain heart diseases cause so great an increase in the quantity of urine? First, it removes those kidney conditions secondary to the heart disease, which diminish the kidney function, when the unburdened organ acts as in health and secretes a natural quantity. But in the cases now referred to, we find the urine increased, from perhaps half a pint, to three, four, or even eight pints daily. Is this excess of urine due to the direct action of digitalis on the kidneys? Were this the true explanation, then this excessive secretion should continue as long as the digitalis is administered; but we find, as I have said, that when the dropsy has disappeared the kidneys no longer secrete in excess. The copious flow of urine must be explained by the fact that digitalis by relieving the heart checks the conditions that produce dropsy, when the dropsical fluid returns quickly into the circulation, and the kidneys eliminate the excessive quantity of water in the blood.

How does digitalis affect the kidneys in heart disease thereby increasing the secretion of the urine?

The separation of the water of the urine is effected chiefly through the Malpighian bodies, probably by simple filtration, and therefore, the amount of the secretion depends on the lateral pressure in the blood-vessels of glomeruli.

Thus, section of the cord below the medulla, *i.e.*, below the vaso-motor centre, causes great dilatation of all the blood-vessels, and thus produces general lowering of the blood-pressure. The diminution of blood-pressure in the kidneys is followed by diminution, and even arrest of the excretion of urine. Section of the renal nerves causing wide dilatation of the renal vessels, and thus, heightening their lateral pressure, causes a great increase in the urinary secretion.

Now in the forms of cardiac dropsy, benefited by digitalis, there is tricuspid regurgitation causing great repletion of the venous system with corresponding emptiness of the arterial system, and thus, arterial tension is greatly lessened.

Some writers ascribe the diminished urinary secretion entirely to this loss of tension. It is true that the venous engorgement causes distension of some of the capillaries of the kidneys, and thus heightens their tension, and it might be expected that this increase of lateral pressure would cause an increase in the secretion of the urine. It is urged that the venous congestion only affects the capillary of the tubules, and does not reach the Malpighian bodies, the capillaries of the tubules preventing this; thus the blood-vessels of the Malpighian bodies through which the water of the urine filters, become partly empty, their pressure greatly diminished, and hence the secretion of the urinary water is diminished. But is this statement true? Are the blood-vessels of the glomeruli partially empty, in cases of tricuspid regurgitation and venous engorgement? To this question I should answer certainly not, for in the post-mortems I have made, these bodies have always been greatly enlarged and engorged, and consequently the lateral pressure increased, and thus the water of the urine should be increased. The diminution of the secretion appears to me to be due to the venous congestion. In tricuspid regurgitation, the passage of blood from the arteries to the veins is very slow; it in fact partially stagnates. The blood on reaching the glomeruli loses much of its water by pressure, but having reached a certain degree of concentration, the further separation of water is much slower. In order to get a rapid filtration of water through the Malpighian bodies, it is necessary not only that there should be high arterial pressure, but also a rapid flow of blood. It appears to me that in venous engorgement, we have high lateral pressure, but a slow flow of blood, and that digitalis acts by removing congestion, and allowing a free circulation through the kidneys.

Digitalis has been employed in the treatment of acute inflammation. Mr. King, of Saxmundham, held that no good was to be effected in inflammation, unless with a large dose, and he gave from half an ounce to an ounce of the tincture; with these formidable doses he declared he could subdue most inflammations, if attacked at their very commencement, and before the organs involved became disorganized. He administered a dose and then waited twenty-four hours to watch its effects; at the expiration of the time, if the pulse did not become much less frequent or irregular, he repeated the dose. He gave as much as two drachms of the tincture to a child of nine months old. Vomiting sometimes quickly follows these very large doses. No serious or dangerous symptoms, says Mr. King, ever followed his extensive and startling use of digitalis. Aconite, I believe, will be found far safer and better in the treatment of acute inflammation than these huge doses of digitalis.

Dr. Royston Fairbank finds digitalis, employed both locally and internally, useful in inflammations. He narrates cases of acute inflammation of joints, acute inflammation of the leg from varicose ulcers, severe inflammation of the breast and of erysipelas, yielding speedily to fomentations, made by infusing a small teaspoonful of the dried leaves in half a pint of boiling water, or by adding a drachm of tincture to half a pint of boiling water, and applied by means of flannels wrung out in this decoction. Sometimes, after simple hot fomentations, he advises the rubbing in of some tincture.

Digitalis will reduce the temperature of fever, though large doses are often required. This treatment is now freely used on the continent in all febrile affections.

In typhoid fever, Wunderlich recommends digitalis, asserting that in two or three days it will reduce the temperature of the body by 2° or 3° Fah., and will slacken the pulse, sometimes, by thirty or forty beats in the minute.

Digitalis controls epistaxis, hæmoptysis, and menorrhagia. In cases of menorrhagia, unconnected with organic disease, this medicine, independently of the state of the circulation, is said to be more efficacious than any other remedy; and when organic disease gives rise to this form of bleeding, the effect of the medicine is scarcely less manifest, although the advantage may be temporary.

The late Dr. Brinton highly esteemed it in bleeding from the lungs, stating that when it reduced the frequency of the pulse the bleeding ceased. The infusion is to be preferred for hæmorrhages, and large doses may be required.

In rare instances, digitalis occasions great strangury, with a desire, almost incessant, to pass water, accompanied by great and painful straining, and, in women, by strong "bearing-down" pains.

Few remedies are of more avail in arresting spermatorrhœa than digitalis in drachm or two drachm doses of the infusion twice or thrice daily. The free application of cold water to the testicles and perineum aids the effect of the medicine; and it is a useful practice to let the testicles hang in cold water night and morning for five or ten minutes at a time.

The late Mr. Jones of Jersey excited considerable astonishment by the announcement of the good effects he obtained from very large doses of tincture of digitalis in the treatment of delirium tremens. He gave half an ounce of the tincture and repeated it when necessary in four hours, and again in six hours; and again when needful in two-drachm doses. Mr. Jones says of this treatment, "the pulse, so far from being lowered in force, becomes fuller, and stronger, and more regular, soon after the first dose. The cold clammy perspirations wear off and the skin becomes warmer. As soon as the remedy produces its full effect, sleep for five or six hours commonly follows. Sleep is the guide to the repetition of the dose. No action on the kidneys is evinced by an unusual secretion of urine. Sometimes the bowels are acted slightly on, but not commonly." Mr. Jones never saw any alarming symptoms follow these large doses, although he treated in this way about seventy cases of delirium tremens. It would appear that he adopted this treatment only in the severer asthenic forms of delirium tremens. With regard to this treatment of delirium tremens, the following conclusions appear to be established:—

1. The medicine may be given in the manner directed without danger.

2. That it very often does good, producing speedily in most cases, refreshing, quieting sleep; and even when it fails to induce sleep, it generally calms undue excitement.

3. That some cases appear to be uninfluenced by the drug.

It yet remains, however, to ascertain the forms of the disease amenable to digitalis.

Under this treatment some severe asthenic cases, when owing to great prostration death seemed imminent, have rallied astonishingly and ultimately recovered. The evidence of this is too strong to be disputed. Under the influence of digitalis, the weak, rapid, and fluttering pulse grows strong and steady, the skin comfortably moist and warm, while with the improvement in the circulation and state of the skin, the general condition of the patient improves. On the other hand, it appears equally certain that sthenic forms of the disease are also amenable to this drug in several instances I have seen this form of the disease yield speedily to huge doses of digitalis; but on two occasions the patients suddenly fell back dead, although, to the moment of death, no warning occurred of this sudden and untoward termination. Whether in these instances death was to be ascribed to the digitalis or to the disease, it is impossible to say:—it is well known that delirium tremens, even untreated, sometimes ends in this sudden, fatal manner.

I give a short account of a case of delirium tremens recently treated with large doses of tincture of digitalis. The man aged about 50 had been a very hard drinker for many years. He was well nourished but his urine contained a considerable quantity of albumen. After trying large doses of chloral and bromide of potassium we gave him a grain of hyoscysmia which quieted him for several hours but did not produce sleep, and as he was in no way benefited by our treatment we resolved to give him half-ounce doses of tincture of digitalis according to Jones's directions. Before giving him this first dose his pulse was 90, regular, and fairly good; in half an hour the pulse rose to 108. In three hours time the digitalis was repeated; in an hour the pulse was 120; in 3 hours 150, irregular; in 4 hours 200, very irregular, very feeble:—in 4½ hours it had fallen to 124 and was much stronger and more regular; during the height it varied between 130 and 140. Next day at noon it fell to 90, and was intermittent but not irregular: in the evening it was 60.

TOBACCO.

A poultice of tobacco leaves is said to relieve pain, and an ointment, made by boiling half an ounce of tobacco in eight ounces of lard, kept constantly applied to the breasts, is also said to arrest the secretion of milk. In this respect it is probably inferior to belladonna (*vide* Belladonna).

As several deaths have occurred through the application of tobacco to the abraded skin, it must be used externally with caution.

Tobacco, when introduced into the eye, dilates the pupil, also when taken by the stomach.

Tobacco produces nausea and sickness, accompanied by great weakness and faintness. It confuses the ideas, dims the sight, enfeebles the pulse, and makes the skin cold and clammy with profuse sweating. Owing to its prostrating effects it removes spasm. Tobacco in the form of clyster, or administered by the stomach, has been employed in colic of the intestines, and in strangulated hernia; but in spasmodic diseases chloroform has quite superseded it. Tobacco-smoking excites an abundant secretion of saliva; hence some persons maintain that tobacco-smoking aids digestion. Smoking acts on the intestines as a slight purgative, and no doubt a pipe or cigar smoked after breakfast is often sufficient to ensure an easy and satisfactory relief of the bowels; and is, perhaps, a practice not without advantage in habitual constipation.

Smoking in excess is, no doubt, a very injurious habit, disordering digestion, lessening the appetite, inducing restlessness at night with disagreeable dreams, and weakening both mind and body. Chronic pharyngitis, the mucous membrane looking like dirty-red velvet, with constant hawking, and also chronic dyspepsia, may in some instances, be clearly traced to excessive smoking. Even amaurosis is said to be sometimes produced by excessive smoking. The habitual smoker has generally a thickly coated tongue. The symptoms produced by excessive smoking soon cease when the habit is discontinued. If the tobacco is of good quality and contains but little nicotine, the evil consequences are much less marked. In the cultivation of the plant it is a point of importance to develope the aromatic principles and to diminish nicotine.

At present it has not been satisfactorily determined which are the structures that tobacco affects. Kölliker teaches that (1) nicotia quickly paralyzes the brain, and destroys voluntary movement; (2) that it excites the medulla oblongata and the cord, producing tetanus, which continues only a short time, and is unaccompanied by increased reflex irritability; (3) that the motor nerves are paralyzed, and if the tetanic movements are severe they assist in producing this paralysis; (4) that the sensory nerves do not appear to be affected by nicotine; (5) that the heart continues to pulsate long after nicotine poisoning; (6) and that the muscular irritability is unaffected by nicotine. Other observers teach that nicotia feebly paralyzes the motor nerves, and destroys muscular irritability.

Nicotia appears to tetanize the heart; for when this organ from a mechanical cause has ceased to contract after death, the direct application of nicotia excites the pulsations, and the heart soon becomes rigidly contracted—tetanized, in fact—and then of course, the beats cease. In birds and mammals killed by chloroform, when the ventricles are immobile and dilated, and respond most imperfectly to stimuli, the application of a drop of nicotine immediately occasions strong contractions in the heart and causes the organ to respond energetically to mechanical and galvanic stimuli.

The experiments of Fraser and Brown show that nicotia, like other tetanizing substances, as strychnia, brucia, thebaia, codeia, and morphia, loses its tetanizing properties when converted into ethyl or methyl compounds; but, unlike these, the methyl and ethyl compounds of nicotine do not possess any paralyzing action on motor nerves. This difference inclines these observers to believe that the convulsions of nicotia are not produced in the same way as those arising from strychnia, brucia, thebaia, &c.

Nicotia has been highly praised in tetanus, and many recorded cases appear to show its usefulness in this fatal disease. It must be administered either by the rectum or hypodermically; when put into the mouth, it very generally excites a severe paroxysm, which may destroy life by firmly fixing the muscles of the chest till asphyxia is produced.

Tobacco-smoking commonly affords some relief in spasmodic asthma; but like all other asthmatic remedies, it succeeds much better in some instances than in others.

Whether the active principle of tobacco is destroyed in the system, or is eliminated with any secretion, is at present unknown.

Nicotine is supposed to be diuretic, but we are not told under what circumstances.

CONIUM AND ITS PREPARATIONS.

The statements of the physiological action of conium made by various observers, coincide in the main; but they contain a few contradictions which cannot at present be reconciled.

We are chiefly indebted to Christison, Schroff, Kölliker, and Guttmann, for our knowledge of the action of this medicine. Paul Guttmann, who has lately published some excellent investigations on the action of this alkaloid, says it is one of the most active and powerful poisons, being in this respect scarcely second to prussic acid; yet some vegetable-feeders, as goat, sheep, and horse, are said to eat hemlock with impunity.

Conium exerts no influence on the unbroken skin, even when applied in large quantity; but strong preparations applied to wounds excite inflammation with its usual accompaniments of heat and pain.

The pounded leaves, or the expressed juice, or other preparation of the drug smeared over a poultice, will ease the pain of ulcers both simple and malignant, and at the same time improve the character of the sore. The pain-easing property of hemlock rests on the evidence of highly competent observers, and cannot be gainsaid; yet it is now rarely employed for this purpose, although formerly it was in constant use as a soothing application to broken cancers and malignant sores.

The alkaloid, whether directly applied to the eye, or swallowed, causes dilatation of the pupil, sometimes with subsequent contraction. According to Harley, the dilatation is never very great.

The smell of conium has been compared to the urine of cats and mice. It has a burning, acrid taste, provoking an increased secretion of saliva. Conia dissolved in alcohol, introduced into a hollow, painful tooth, has been employed in toothache.

Hemlock has scarcely any influence on the stomach and intestines. It may produce nausea, vomiting, and diarrhœa; but such occurrences are not common. Walshe has seen it relieve the pain of cancer of the stomach.

That conia enters the blood is proved by the symptoms arising when it is swallowed; but the physical or chemical changes —if any—it undergoes in the blood are at present unknown. Added to blood after its removal from the body, it produces in it no perceptible alteration.

The deficient coagulability and dark colour of the blood, after death from this drug, noticed by some, according to others are often absent; and when present, are due probably to the fatal asphyxia.

The effects of conium on man and animals is very similar. The best account of the symptoms occurring in a human being from a poisonous quantity of the plant, is given by Dr. H. Bennett, who has recorded the case of a man who ate hemlock in mistake for salad. Weakness of his legs, so that his gait was faltering, was first noticed; as the weakness increased he staggered, as if drunk, and at the same time his arms began to be similarly affected. Perfect loss of all voluntary movement followed, and he was unable even to swallow. Lastly, the muscles of respiration were slowly paralyzed, and he died of asphyxia. Up to his death his intelligence was apparently unaffected, but his sight was destroyed. Slight movements in the muscles of the left leg took place.

The same, or nearly the same, sequence of events happens in animals poisoned by hemlock. With rabbits, early and severe convulsions occur, but in frogs these are absent. In all the experiments and observations of Guttmann, gradual paralysis of the voluntary muscles, and then of the respiratory muscles, took place. The paralysis began first in the hind extremities, next affected the anterior, soon afterwards the muscles of the trunk, and lastly those of respiration.

How this paralysis is produced will be next considered. It is to Kölliker and Paul Guttmann we are indebted for most of our exact knowledge on this subject.

The paralysis is certainly not due to the action of the hemlock on the muscles, for in an animal completely paralysed by conia to such an extent, that galvanic irritation through the nerves entirely fails to excite contractions, yet a current made to pass through the muscles themselves will excite energetic contractions. Nay, further, the irritability of muscles through which blood poisoned with conia has been permitted to flow is as great and as enduring as that of muscles of the same animal protected from the action of the poisoned blood by a ligature of the blood-vessels.

Nor does hemlock paralyse by its effect on the spinal cord, for if a limb is protected from the influence of the poisoned blood by ligature of both its artery and vein, and the animal (frog) is then poisoned and thoroughly paralysed by conium, the ligatured limb can still manifest powerful movements. Moreover, irritation of any of the paralysed parts is answered by energetic contractions in the ligatured limb.

This last experiment greatly narrows the question before us, namely:—Through what tissues does hemlock paralyse? In this experiment the only muscles whith retained their power of movement were those protected from the poisoned blood by ligature of the vessels; and it follows that conia operates on some of the tissues thus protected, that is, either on the nerves or muscles; and it follows as conclusively that the paralysis is due in no respect to the action of the poison on the brain or cord; for these parts were freely supplied with poisoned blood, while their nervous communication with the ligatured leg was intact, and yet this limb remained quite uninfluenced. We have, therefore, to decide whether conia affects nerves or muscles; but this question was answered already, when it was proved that the poison exerts no influence on the contractility of muscle.

The investigation may be carried a step further; for an experiment of Guttmann proves that the poison affects the periphery of the motor nerves earlier than their trunks. The leg of a frog, after the vessels leading to it had been tied, was separated from the trunk, except by the chief nerve, and the animal was then poisoned. The uninjured limb in free vascular communication with the trunk, the extremities of the nerves being exposed to the action of the poisoned blood, became quickly paralyzed, while at the same time contractions through the femoral nerve were easily produced in the limb protected from the poison by its partial separation from the body. In this experiment the main trunk of the nerve of each leg was equally subjected to the poison, but in one instance the termination of the nerve was exposed to the poison, and in the other was protected from its influence. The paralysis, as we have seen, occurred speedily in the limb whose peripheral nerves were subjected to the poison, showing that the primary action of conia is exerted on the terminations of the nerves; but, ultimately, the trunks themselves become paralysed, for after a time the partially severed limb became paralysed below the point of section, even when the trunk of the nerve exposed to the poison was irritated.

Are the sensory or afferent nerves in any way affected? Apparently not, as they can certainly convey to the cord or brain afferent impulses in an animal rendered quite motionless by the poison.

This is shewn by the following experiment. If the legs of a frog are protected by a ligature of both arteries and veins, and the animal is then completely paralysed by conia, energetic movements can be excited in the ligatured limbs by irritation of the paralysed parts. Whether these movements are purely reflex, or whether they are voluntary and are occasioned by pain, it is in this case impossible to decide; but at all events this experiment conclusively shows that in frogs the afferent nerves of completely paralysed parts can convey impulses to either the cord or brain. When the paralysed parts of animals higher in the scale than frogs, as rabbits, are pinched, they exhibit signs of pain, if we may judge from their aspect and from the noise they make, till the face and larynx are themselves affected, and it is therefore probable that sensory nerves convey impressions to the brain, even when the animal is almost perfectly paralysed in respect of voluntary movement.

The vaso-motor nerves of some parts appear also to be affected by conia; thus the arteries of the frog's foot fail to contract on irritation when the animal is poisoned by hemlock, but the motor nerves of some other involuntary muscles are uninfluenced by conia, as the peristaltic contraction of the intestines of the rabbits killed by the alkaloid continued active after death.

Applied directly to the nerves, hemlock destroys their conductivity. The poison produces no pain.

Its influence on the brain will next be considered. No doubt both man and animals remain conscious of pain so long as they are capable of giving any signs of it; that is, before the muscles of expression become paralyzed. But consciousness is possible, though at the same time the brain may in some way be affected. Schroff states, that the poison, soon after it is taken is followed by a sensation of heaviness in the head, with giddiness, inability to think, great impairment of common sensibility, blunted taste, dimmed sight, dilated pupils, and a sensation as of insects crawling on the skin.

The mind is evidently in some degree weakened, and many of the special senses suffer. In Dr. Bennett's case there was total blindness, but the hearing was but little, if at all, dulled. Some observers assert that the mind remains quite uninfluenced by hemlock.

In poisoning by hemlock, as I have said, the pupil dilates, at the same time there is drooping of the upper eyelid, due of course to paralysis of the third nerve, which leads Dr. H. Wood to conclude that hemlock affects the pupil by paralysing the third nerve, not by stimulating the sympathetic.

At an early part of this section it was stated that convulsions resulted from poisoning by conium. Convulsions occur in some animals, not in others. Rabbits appear to suffer from convulsions, but frogs die unconvulsed. These spasms, Kölliker has suggested, may be due to asphyxia from paralysis of the muscles of respiration. This explanation, however, appears to be insufficient, as convulsions are often among the earliest symptoms, before any asphyxia has resulted; nay, if a tube is introduced into the trachea, and artificial respiration is performed, they still occur. In man convulsions are certainly sometimes absent, and in the case recorded by Bennett only slight movements in the left leg were witnessed.

In their recent investigations, Drs. Crum Brown, and Fraser for the most part confirm the conclusions of Kölliker and Guttmann. They have shown, that specimens of conia are not of identical composition; for while each specimen produced the same symptoms, these they find were not always produced in the same way. In other words, some specimens affect chiefly the motor nerves, while others act on both motor nerves and cord. Their observations on hydrochlorate of conia, methyl-conia, and iodide of dimethyl-conium, in a great measure explain these differences. They conclude that conia "produces paralysis solely by influencing the motor nerves," and that hydrochlorate of methyl-conia acts "on the motor nerve and spinal cord; with large doses the former action is completed before the latter." They conclude that commercial specimens of conia consist of mixtures in variable proportions of conia and methyl-conia; sometimes methyl-conia is present in small, at other times in large quantities; and that this variety of composition explains the varied physiological effects of different specimens of conia.

Their observations on iodide of dimethyl-conium "show that the paralysis produced by dimethyl-conium is dependent on an action on the motor nerves primarily restricted to the peripheral terminations," and that the substance "is entirely free from spasmodic and paralyzing actions."

Dr. John Harley's physiological experiments lead him to the conclusion that succus conii is a depressant of the motor tract of the cord, and the moter ganglia of the brain. Dr. Fraser's observation that succus conii generally, if not always, contains methyl compounds of conia, serves to explain the discrepancy existing between Guttmann, Kölliker, and Harley.

Concerning the action of this poison on the heart, very conflicting statements have been made. Some authorities state that it reduces the frequency of the pulse, especially when the heart beats too quickly from disease, as from fever, etc. Even a small dose under such conditions, they say, suffices to produce a very decided effect on the pulse, while in health the same quantity exerts no influence. Such are the conclusions of Wertheim.

Kölliker, Guttmann, and J. Harley, conclude that conium does not affect the heart. Harley who gave the medicine in sufficient quantities to produce partial paralysis, says, "excepting as a transient emotional effect in nervous individuals upon the sudden accession of the symptoms after a first dose of hemlock, the heart and blood-vessels are absolutely unaffected by its operation. I have carefully determined this in persons of all ages—in the weakly infant not three months old, in the strong, in the debilitated, and in those who have intermittent action of the heart.

In experiments with warm-blooded animals poisoned by hemlock, the heart, it is true, soon ceases to beat; but this can be for a long time retarded if artificial respiration is performed, and in the case of the frog the poison appears to leave the heart unaffected. Hemlock has been recommended in fevers and acute rheumatism, and in these diseases its efficacy has been supposed to be explained by its action on the heart. But, as we have just seen, it is very doubtful whether conia exerts any influence on the heart.

In doses sufficient to produce physiological effects, conium, Harley says, may be taken for months without affecting nutrition.

It is supposed to be useful in whooping and other coughs. The succus conii in one to four drachm doses, or even more, has been recommended lately by J. Harley in chorea; and these large doses certainly control the movements temporarily and impart steadiness to the patient, but the improvement wears off if the medicine is not soon repeated. Some cases, no doubt, are cured: but in my experience this treatment, in most instances, only palliates, and on discontinuing the drug, the symptoms return with customary severity. In order to maintain the effects of conium on the choreic movements, the dose must be quickly increased, for patients speedily become tolerant of the drug, and after a short time will bear enormous doses without the induction of any physiological effect. Thus, on one occasion, I gradually increased the dose, till the patient—a child—took, except when asleep, seven drachms of succus conii hourly.

We have the high authority of Dr. Neligan in favour of hemlock in various painful affections, as cancer, rheumatism, and neuralgia. It has not yet been shown in any well-authenticated case that conium produces either sleep, coma, or delirium.

Considering the physiological action of conia, it would appear that it is not indicated in convulsive diseases dependent on affections of the cord, as tetanus and strychnia poisoning; for the effects of this drug and the symptoms of these diseases are not antagonistic. Guttmann, from whose valuable paper on the action of conia the chief part of our remarks has been extracted, put to the test of direct experiment the power of conia to arrest or check in any degree the tetanus from strychnia. He strychnized frogs, and then gave them conia; but even when administered in doses sufficient to completely paralyze the animals, this drug failed to check, in any degree, the tetanic spasms produced by the strychnia.

Professor Christopher Johnson, of Maryland, however, reports cases of recovery from severe traumatic tetanus under the use of conia. In one case be injected hypodermically, every two hours, fifteen minims of a solution composed of two minims of conia, one minim of dilute sulphuric acid, to one drachm of water. In the second case, he commenced with twenty minims of the same solution every three hours; he then increased the conia to one-third, then to two-thirds of a drop, and ultimately to rather more than a drop every hour, when the symptoms abated. Afterwards he used two minims of conia hourly, but owing to the weakness of the pulse he returned to one minim every two hours, but the spasms returning, he again used two minims every hour, and immediately the spasms diminished. But these cases, unfortunately, are much less satisfactory than they might have been. In the first case, the cicatrices of the wound were removed by a hot iron, and in the second, bromide of potassium and morphia were administered. But Dr. Johnson says that the spasms were considerably reduced after each conia injection.

Dr. Crichton Browne strongly recommends conium in acute mania. In common with Dr. John Harley he believes that it represses undue activity of the motor centres.

It will be obvious how very similar the action of conia is to that of curare. One difference there is between these substances which has not been noted. Curare, when swallowed, is not poisonous, but is scarcely toxic when injected under the skin; given in either way is equally poisonous.

Claude Bernard believes that the innocuousness of curare administered by the stomach is due to its slow absorption, as compared with its much more rapid elimination by the kidneys, so that a very minute quantity is retained in the blood.

Dr. Harley draws particular attention to the fact that the only preparation of any value is the juice: and so true is this, that the various statements made concerning the success and failure of conium in various diseases must be accepted with caution, unless the conclusions have been deduced from observations founded on the employment of the juice.

CALABAR BEAN.

The following account of the Calabar bean is for the most part an abstract of Dr. Fraser's very valuable and elaborate investigations concerning the physiological action of the Calabar bean.

Dr. Fraser finds that this poison destroys birds most easily, while frogs require as much as will kill a dog.

Little is known at present of the influence of the Calabar bean or its alkaloid on the stomach. Dr. Fraser has ascertained that gastric juice does not destroy the power of this drug, and further that a solution of it injected into a vein, may be detected in the contents of the stomach, whence it has been concluded that the active principle is eliminated by this organ. It is, however, possible that it may find its way there by mere imbibition.

The active principles of Calabar bean quickly enter the blood. An animal under the influence of a small but fatal dose speedily manifests a slight tremulousness, which beginning in the hind-quarters, spreads to the rest of the body; the posterior limbs soon grow powerless, next the anterior extremities, and then the trunk, till muscular movement ceases and the whole animal frame becomes limp and flaccid. Next follows general paralysis, the bowels and bladder are emptied involuntarily, and the pupils generally contract. At this stage all reflex action of the cord is destroyed and if the animal is anywhere irritated, no contractions respond to the call. Under the influence of the poison, respiration grows gradually slower and slower, and at last ceases. So long as the animal retains the power of expression, evidence of consciousness appears to be preserved throughout. Immediately after death the pupils dilate. After death the muscles appear to be unaffected; they contract as they are cut, and respond to the irritation of their nerves. The heart, moreover, continues to beat the usual time after death, its parts ceasing to contract in definite order. After a large, fatal dose, the symptoms and post-mortem appearances are much the same as those just described, but of course death occurs sooner, and the symptoms follow each other in quicker succession. After a very large dose, death may be almost instantaneous and it appears to be owing to syncope; for when the body is opened the heart is motionless, dilated, flaccid, and contracts but languidly on stimulation. The vermicular movements of the intestines are also more sluggish than after a smaller dose.

Whether Calabar bean produces its effects by influencing the muscles, nerves, cord, or the brain, are questions which will now be severally considered.

As muscular contraction could be easily and abundantly excited by direct irritation of the muscles, after the motor nerves had quite lost their power to conduct impressions, Dr. Fraser concludes that this poison exerts no influence on the voluntary muscles. Moreover, in his experiments the contractility continued long after death, and in frogs the rigor mortis was long postponed, while it certainly was not hastened in warm-blooded animals,—additional evidences of the absence of any paralysing influence on the muscles by Calabar bean. The tremors in warm-blooded animals were generally slight, though sometimes excessive, and might indeed be called convulsions, and were due probably like curare to the direct action of the poison on the muscles; for if the sciatic nerve was divided before poisoning the animals, the limb thus cut off from nervous connection with the nervous centres still trembled; while, on the other hand if the sciatic nerve was uninjured, but the arteries leading to the limb were tied or divided, then, while the muscles of the body generally trembled, those of the ligatured limb remained at rest. This tremulousness often continues after death, and is excited by exposure and by the knife in cutting. It does not affect the whole muscle at the same time, but different parts in succession.

Observing that consciousness is intact whilst paralysis is marked and progressing, and that if a frog's brain is removed before the animal is poisoned, paralysis ensues as usual, Dr. Fraser concludes that the paralysis is not produced by any changes in the brain; but from the effects of the drug on himself he thinks the bean does exercise some influence on the faculties of the mind.

That paralysis is not produced by the action of the poison on the spinal nerves is evident; for long after the induction of general paralysis, and even after death, they conduct motor impressions to the muscles.

But though muscular paralysis and death are not to be accounted for by the action of the poison on the motor nerves, but in another way, as we shall shortly see, still after a time the poison does affect these nerves, and robs them of their power to conduct impressions to the muscles. As with conium, so probably with Calabar bean, the peripheral terminations of the nerves are first affected, and next their trunks. The afferent nerves remain unaffected, and certainly their power of conduction is not lessened; indeed, Dr. Fraser thinks it is increased.

The spinal cord, then, is the only part left on which the paralysis can depend, and Dr. Fraser has shown that paralysis of the muscles is due to changes effected by Calabar bean on the cord. Thus he found he could excite no muscular contractions by galvanising any part of the cord of an animal poisoned by the bean, while the motor nerves still retained their functions and easily transmitted impressions to the muscles, which on their part freely responded to very slight stimulation of their proper nerves.

The reflex functions of the cord were destroyed long before the nerves lost their conducting power. After the loss of reflex power, in animals poisoned by Calabar bean, pretty active muscular contractions could be excited by mild galvanic stimulation of the motor nerves, showing that the arrest in reflex action is not owing to lowered activity of the motor nerves. Again, if the lower half of the cord is protected from the poisoned blood by ligature or section of its vessels, while the blood is permitted to flow to all other parts of the body, and the animal is then poisoned, reflex action is speedily lost in the anterior, while it is retained for hours in the posterior limbs. As the nerves of every part of the body are equally subjected to the poison, the loss of reflex power cannot be due to alterations in them, otherwise the hind and front limbs would be equally paralysed. The only part protected from the poison was the lower half of the cord, and it must be that Calabar bean destroys reflex power through the changes produced in the cord itself.

From its physiological action on the cord, Fraser recommends the ordeal bean as an antidote to strychnia, and he points out its superiority to curare, which paralyses only the motor nerves, while Calabar bean paralyses first the cord, and then, after some time, the motor nerves.

Large doses of the bean instantaneously arrest the movements of the heart; smaller doses reduce their frequency.

Dr. Fraser contrasts Calabar bean with other cardiac poisons, such as antiaris toxicaria, tanghinia venenifera, digitalis, helleborus niger, helleborus viridis, and the green resin of nereum oleander, all of which, after a time, diminish the frequency of the heart's contractions by prolonging the systole, and finally stop the heart in the systolic act. Physostigma also diminishes the number of the heart's contractions, but it lessens the duration of each systole, and at last the heart ceases to beat in the diastole.

How does Calabar bean effect these changes in the functions of the heart? The paralysis of the heart in diastole, and the diminution in the frequency of its contractions by protracted periods of rest in a *dilated condition*, as well as the frequent renewal of its action after a long pause in diastole, might, in the first place, suggest the interference of the inhibitory functions of the vagi nerves. Dr. Fraser, however, adduces conclusive experiments against this supposition. He finds, after section of each vagus, or after paralysing them with curare, (which it affects in a few minutes in both the motor and vagi nerves,) Calabar bean acted on the heart just as before. Again, when before poisoning frogs their brain and cord were destroyed, the bean produced the same effects on the heart.

Arnstein and Sutschinsky while agreeing with Fraser, that physostigma does not affect the heart by its influence on the inhibitory centre, conclude experimentally that it heightens the activity of the terminations of the pneumogastric nerve; for they find that after Calabar bean poisoning, a much weaker electric current is required to slow or arrest the heart's action, and further, if the ends of the pneumogastric nerves are poisoned by atropia, physostigma will restore the function of the paralysed nerve.

Physostigma heightens arterial pressure which is partly due to the action of the poison on the vaso motor centre, for to a considerable extent this increased pressure is lost or prevented when the cord is divided below the vaso motor centre.

Physostigma is also a respiratory poison, and indeed generally kills by paralysing the respiration.

Dr. Fraser finds that solutions of Calabar bean added to blood made the red corpuscles of rabbits and dogs irregular, but effected no changes in those of birds or frogs, nor in the white corpuscles of any animal he examined.

The solutions appear to produce no change in the respiratory functions of the blood.

The lymph hearts of frogs became paralysed at an early stage of the experiments.

The intestines of animals poisoned by the bean moved at first with increased vigour, but at last contracted so as considerably to lessen the calibre of the gut, which afterwards became again dilated. The movements continued some time after death, except after a large dose of poison, when they were slight, and soon ceased. Large doses administered in tetanus often excite severe colicky pain in the abdomen due probably to increased peristaltic action, whilst the bowels are relaxed, probably from increased intestinal secretion. Physostigma also increases perspiration and this is often one of the earliest signs of its toxic effects.

In rabbits poisoned by this bean Fraser noticed peristaltis in the cornua and body of the uterus and in the ureters.

The ingestion of Calabar bean, as is well known, causes the pupil to contract, an effect still more marked when a solution is dropped into the eye. Whether this contraction is produced through the sympathetic or otherwise is still an open question.

Dr. Robertson finds that even before the pupil begins to contract, the power of accommodation is lost, and that objects can be seen only at a limited distance of about a foot, all beyond appearing hazy and indistinct. The accommodating power, being affected before the pupil, is also the first to recover itself. Objects at all distances appear nearer and larger, than they really are. The bean induced in the affected eye a sensation as of much straining and heaviness, like that occurring after a close inspection of fine objects.

About twenty minutes after the application of the solution, the pupil contracted to one half, and the field of vision was still further shortened. The contraction may increase for an hour or more, the sight of the other eye meanwhile remaining natural. The contraction ultimately slowly yields, but more than twenty-four hours may pass before the pupil resumes its natural size. The contraction may be extreme, when, but little light finding its way through the narrowed pupil, the opposite pupil may dilate sympathetically.

Dr. Robertson has further shown that, in their action on the eye, belladonna and Calabar bean are directly antagonistic. The bean is freely used to produce contraction of the pupil.

Dr. Fraser has obtained some curious results from the topical application of solutions of Calabar bean to different structures of the body. He applied some solution to the trunk of the sciatic, choosing this nerve on account of its comparative freedom from bloodvessels, and found to his astonishment that sensory conductivity was lost sooner than motor, and became at last completely destroyed. This loss of power to conduct sensory impression was not produced by mere imbibition of the fluid altering the physical state of the nerves, as other nerves kept moistened by water for a like time underwent no similar functional alteration. The completeness of this loss of power to conduct afferent impression was well shown by poisoning the animal by strychnia, after which no convulsive movement could be excited by irritating the structures below the poisoned sciatic nerve. The irritability of the gastrocnemius was also destroyed by the local employment of strong solutions of the bean. This, too, was proved not to be due to mere imbibition.

When the solution was painted on parts of the intestines, these became relaxed, and the vermicular movements, on reaching these points, skipped over them, and continued in the portions beyond.

We now come to the therapeutical application of this remedy. It was some time ago suggested that the Calabar bean might prove of much service in tetanus and chorea, and Dr. Fraser has lately written an interesting paper on this subject, from which we again largely borrow. Finding that the effects of strychnia on the frog can be arrested, he believes that the bean may be used with the greatest benefit in tetanus. Dr. Fraser very naturally insists on the importance of employing the drug at the very beginning of the attack, and enforces the value of this advice by the remark, that it has now been shown that when muscles contract they beget a substance which excites muscular contraction; and, further, that only a limited part of the cord or of the ganglia of the brain is affected at the beginning of tetanus, but, as the attack goes on the whole of the structures become speedily involved. It may be administered by mouth, anus, or subcutaneously. When the convulsions are severe, and when the slightest movement excites them, it is obvious that till the severity of the paroxysms is subdued, only the subcutaneous method can be used. Yet whilst the patient can still swallow, my experience leads me to prefer giving the drug by the mouth; for the drug to be of any use it must be given in quantity sufficient to produce paralysis, and must be given indeed to such an extent that but a little more would permanently arrest breathing. The drug, therefore, must be given with great care and watchfulness, and to get the necessary effects without inducing serious symptoms, it is better to give small and increasing quantities every hour or oftener, for then should serious paralytic symptoms arise, the drug can be stopped. Moreover, it is impossible to tell the dose adequate to subdue the paroxysms and produce paralysis, some persons requiring a much larger quantity than others. Hence it is evident that it is more convenient to give the liquid extract by the mouth than subcutaneously. I have already in part spoken of the dose. It is generally, nay, probably always, necessary to produce a certain degree of paralysis amounting to heaviness of the limbs. Sometimes the dose of the spirituous extract must be very large; thus Dr. Eben Watson, who failed to obtain good effects from hypodermic injection, prefers to administer the drug by the mouth or rectum, and insists on the necessity of giving enough extract to produce relaxation of the spasms. He has given it to the extent of seventy-two grains in twenty-four hours.

In a successful case under my care, reported in the *Practitioner*, the patient for a day and a half took 2¾ grains of the watery extract hourly, and for a short time 4 grains hourly. It is of course too much to expect that Calabar bean will cure every case of tetanus, but I feel convinced were the treatment begun at the outset of the attack and the drug pushed sufficiently, the results would be more successful than those at present attained.

Dr. Fraser next makes a few remarks on the influence of this remedy over chorea, but at present there appears to be little evidence on this subject. "The treatment of this disease," he says, "will rarely require to be so active or energetic as that recommended for tetanus. Physostigma should be administered either in the form of powder or of tincture. From three to six grains of powder, three or four times daily, may be given to children, and from ten to twenty grains, as frequently to adults."

Dr. Crichton Browne finds Calabar bean markedly useful in general paralysis of the insane; indeed, he has even cured some of his patients of this severe disease. I have known it arrest the progress of general paralysis, and even slightly improve the mental and physical condition. I have seen it not only arrest progressive muscular wasting, uncomplicated with much mental disorder, but also effect considerable improvement in the muscular power. Moreover, it has appeared to me to be serviceable in some cases of long standing hemiplegia. I have given the extract of physostigma in one-thirtieth of a grain doses every two hours.

In conjunction with Dr. Murrell, I have made observations on the influence of Calabar bean on certain nervous affections, giving one-tenth of a grain of the extract every three hours, and in some instances we have continued this treatment more than a year. We gave it in five cases of paraplegia due probably to myelitis. In one case no improvement ensued; and but slight amendment in another; but even when the drug failed to produce any improvement it yet seemed to us to arrest the disease. In old-standing cases we could hardly hope for any amendment where the lower part of the cord had become disorganised; but we might fairly hope to control the march of the disease in the less affected parts. In two cases very marked improvement occurred, an improvement so decided as fairly to astonish us, but in both relapse took place and the patients became as bad almost as before undergoing treatment.

In the fifth case the treatment effected a considerable and permanent improvement, so that the patient who was unable to move his legs even in a slight degree was enabled before his discharge to walk about the ward without his stick. These cases it will be said do not tell conclusively in favour of the efficacy of physostigma in paraplegia, we were both, however, struck by the evident temporary improvement in some of the cases and the decided and permanent amendment of one patient, which we could not help attributing to the drug, and we feel sure that this subject is well worth further investigation. We gave the drug in the same dose to two cases of locomotor ataxy, in one case for a year in the other for three months, both cases improved, and one, a very bad case considerably. We gave it also in a recent case of writer's cramp, and in two months the patient recovered.

Between Calabar bean on the one hand and chloral, atropia, and strychnia respectively there is a well-marked antagonism. Here we shall have occasion to speak only of the antagonism between physostigma and chloral, referring the reader for account of the other antagonisms to the chapter on belladonna and that of strychnia. The committee of the British Medical Association, in their recently published investigations concerning the antagonism between drugs, conclude that the antagonism between physostigma and chloral is greater than that between physostigma and atropia. They point out that the antidotal properties of a drug are of course modified by its more or less rapid action on the system. Serious and even fatal symptoms ensue from Calabar bean much more speedily than from chloral; therefore, to obtain the antagonistic effects of chloral, it must be given either before or immediately after the ingestion of Calabar bean. The antagonism is not complete, for in spite of an antidotal dose of chloral, physostigma although it averts convulsions still produces muscular twitchings, tremors, salivation and contracted pupil; moreover, a quantity of Calabar bean beyond a minimum fatal dose will kill, notwithstanding chloral.

MUSCARIN.

Muscarin, the active principle of poisonous fungi, was first extracted from the *Amanita muscaria*, and physiologically tested by Schmiedeberg. His conclusions regarding this substance have been confirmed and our information extended by the researches of Koppe, Prevost, Alizon, Lauder Brunton, and Schiff. Great interest attaches to muscarin on account of the close similarity of its action to pilocarpine and its almost complete antagonism to atropia. It excites copious perspiration and salivation, a flow of tears, and it increases the intestinal mucus and the biliary and pancreatic secretions. Muscarin affects especially the heart and intestinal canal. It produces "uneasiness in the stomach, vomiting, purging, a feeling of constriction in the neck, want of breath, giddiness, fainting, prostration, and stupor."* The stools sometimes contain mucus or even blood. Topically applied, the merest trace at once arrests a frog's heart; it slows the heart of mammals, reducing the beats from 120 to 60, 40, or even to 9 beats per minute, and sometimes it causes intermittency. M. Alizon maintains that it first quickens the heart. It arrests the heart in diastole; according to Prevost, by exciting the intracardiac nerve-centres. It diminishes blood-pressure partly by its action on the heart, but partly by dilating the blood vessels. Respiration is depressed in proportion to the depression of the pulse. It causes strong contraction of the intestines and bladder; it lessens urinary secretion, even to the point of suppression; it contracts the pupils.

In all these particulars atropia promptly antagonises muscarin. When a frog's heart is arrested by the topical action of a minute quantity of muscarin, the application of a little atropia will immediately restore the pulsations.

Lauder Brunton has shown that muscarin has a singular effect on the pulmonary vessels. Schmiedeberg had noticed that muscarin produces intense dyspnœa—a condition in which the arteries contain very little blood, scarcely bleeding when cut across. Brunton's experiment on a narcotised rabbit shows that this dyspnœa is due to the muscarin causing strong contraction of the pulmonary blood vessels, so strong that the lungs become blanched, and, owing to the contracted state of the pulmonary blood vessels, the right side of the heart becomes greatly distended. A small quantity of atropia injected into the jugular vein at once removed this spasm of the pulmonary vessels, and unloaded the gorged right heart.

Muscarin, like pilocarpine (Jaborandi) is supposed to arrest the heart by stimulating the intracardiac inhibitory apparatus.

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* Lauder Brunton.

Stimulation of the vagus inhibits the heart's action. Thus the application of a weak electric current prolongs diastole and so slows the heart; a strong current completely arrests the heart. After poisoning by curare, stimulation of the vagus no longer affects the heart, but on applying the electrodes to the sinus venosus the heart's action is immediately inhibited. It is therefore concluded that urari paralyses the vagus but leaves the intra-cardiac inhibitory apparatus unaffected. After poisoning by atropia neither stimulation of the vagus nor of the sinus affects the heart, therefore, it is concluded that atropia poisons both the vagus and the intra-cardiac inhibitory apparatus. After the local application of either muscarin or pelocarpine the heart is quickly arrested in diastole, "like a heart inhibited by profound and lasting vagus stimulation. This effect is not hindered by urari. The application of a small dose of atropia at once restores the beat. These facts are interpreted as meaning that muscarin (or jaborandi) stimulates or excites the intra-cardiac inhibitory apparatus which atropia paralyses." (Foster's *Physiology*).

Schiff believes that poisonous mushrooms produce other symptoms than can be accounted for by the action of muscarin, as restlessness, convulsions, and dilatation and contraction of the pupils; and he is led to believe that poisonous mushrooms contain two active ingredients—one having an opposite, the other a similar, action to that of atropia.

In conjunction with Mr. E. A. Morshead, I have made some investigations regarding the action of muscarin on the human body.

Our observations were undertaken to endeavour to ascertain whether the action of muscarin on man is the same as on animals. The muscarin we employed was synthetically prepared by Merck, of Darmstadt. In the following experiments we administered the drug hypodermically. We have made thirteen experiments on four men, seven, three, two, and one respectively. These men, it is well to state, were not in good health; three were in a delicate anæmic state, the other had slight fever from some obscure cause, though his pulse we not quickened.

A large number of preliminary observations were made to ascertain the minimum dose adequate to produce symptoms. This we found to be a third of a grain given hypodermically.

We find that the action of muscarin on man is identical with that on animals. It contracts the pupil, excites profuse perspiration, free salivation, running at the eyes and nose; it purges, sometimes excites nausea and vomiting, and a strong desire to pass urine.

We shall now speak more in detail of these different effects.

Perspiration.—Sweating occurred in eleven of the thirteen experiments. Half a grain always made it free, whilst larger doses, as three-quarters of a grain and a grain, rendered it very abundant; indeed, it was quite as free as the perspiration excited by a third to half a grain of pilocarpine. The perspiration stood in large drops on the face after the larger doses, the night-dress became soaked, and the skin felt sodden. In one man, though we gave one-third of a grain and one grain respectively in two experiments, we produced no sweating, but free salivation, amounting to four ounces. Perspiration began in from three to fifteen minutes, occurring earliest after the larger doses. It lasted from half an hour to an hour and a half. On testing the reaction of the sweat in six experiments, we found it neutral in four and alkaline in two.

Salivation was not so constant as perspiration; moreover, the saliva varied in quantity more than the perspiration, corresponding in this respect to pilocarpine. Salivation occurred in eleven experiments, and was absent in four. In three it was slight, in the rest free or profuse. It began in from two to fifteen minutes, and lasted from twenty to eighty minutes.

Lacrymation occurred in eight cases, amounting in some instances only to suffusion of the eyes, but generally the tears trickled down the face, so that the patient was obliged to wipe his eyes. It began in six to ten minutes, and lasted generally about twenty to thirty minutes.

Purgation.—In the cases in which it purged the injection took effect in from ten to twenty minutes. In two experiments the drug excited an inclination to pass a motion; in four experiments on the same man, it produced a loose motion, one of a green colour, though his bowels were opened naturally a short time previously.

Pulse.—In one of our four men the pulse was always very quick; in the other three it was natural. The effect on the normal frequency was *nil*, or almost *nil*, though in one man, on whom only one observation was made, it reduced the frequency ten to sixteen beats. The medicine reduced the quick pulse from 120 to 80 and 60 beats per minute. Our observations are too few to enable us to speak with certainty of the influence of muscarin on the pulse, but it appears to us that the doses we employed affect the frequency very little, but the larger doses made the pulse softer and more compressible.

Respiration.—The frequency of breathing was unaffected in every experiment.

Sight.—We have notes of the states of the pupils in only ten experiments. In each case the pupils became contracted, often considerably; the contraction beginning in about fifteen minutes. The vision seemed unaffected.

In three of our experiments made on one man with the larger doses, the drug induced vomiting once, and once nausea.

In five experiments the patients were obliged to pass urine in from nine to fifteen minutes after the injection, and two complained of suprapubic pain. In five the drug produced a frequent hacking cough. In none did headache or other nervous symptoms arise.

To show how close is the similarity in the action of muscarin to that of pilocarpine, we give a short account of the effects of the latter drug.

Jaborandi (pilocarpine) flushes the face and produces copious perspiration and salivation. It increases the bronchial secretion, exciting a slight cough, and produces slight running at the eyes and nose. It causes nausea and sickness, and, according to some authorities, diarrhœa, though this never occurred in the numerous experiments made by me in conjunction with Mr. Gould and Mr. Murrell. It considerably quickens the pulse. It often produces headache, generally frontal, with heaviness over the eyes, associated with giddiness and a stupid feeling. The sight is generally hazy, and in about two-thirds of our observations, when the drug was applied to the eye, it contracted the pupil, often considerably; though, when administered by the stomach or hypodermically, it had but little influence on the pupil. It often produces suprapubic pain, and still oftener a strong and irresistible impulse to pass urine.

The similarity between the action of muscarin and pilocarpine is evident. There are, however, slight differences. The perspiration and salivation are generally greater after pilocarpine and last a longer time, though possibly larger doses of muscarin might in this respect rival pilocarpine. We are led from our experiments to conclude that muscarin acts rather more on the lachrymal glands than pilocarpine. Muscarin certainly acts on the bowels far more powerfully than pilocarpine. Muscarin internally administered contracts the pupils far more strongly than pilocarpine. On the other hand, jaborandi produces more suprapubic pain, and more frequently and more strongly the impulse to pass water. Moreover pilocarpine produces headache and giddiness, symptoms never yet noticed by us after muscarin. In our experiments with muscarin none of our patients complained of any disturbance of the sight, but on this point we have not sufficiently examined them. Pilocarpine produced a little drowsiness, but we have not observed this after muscarin. In our experiments on man, pilocarpine in every case quickened the pulse, and as this fact has been amply corroborated by other observers, we may conclude that it is established, though Langley, in his experiments on animals, finds that it slows the heart, acting thus on animals like muscarin. In our experiments on man, muscarin produced very little effect on the pulse; if it altered frequency at all, it reduced the number of beats.

Whilst muscarin thus so closely resembles pilocarpine in its action on the body, in one respect it strangely differs. Administered internally, either by the stomach or subcutaneously, pilocarpine slightly contracts the pupil; topically applied to the eye it strongly contracts the pupil. Muscarin, given hypodermically, contracts the pupil far more than pilocarpine; but, strange to say, when applied to the eye itself it widely dilates the pupil. Thus, whilst it is so generally antagonistic to atropia, in this one respect it is similar. In respect to its action on the pupil it corresponds to gelseminum, which, administered by the stomach, contracts the pupil, but applied locally widely dilates it.

We tested the topical effect of muscarin in nine cases, using a solution containing one part of the drug in ten of water. This solution produces very little and only transient smarting. In every case the pupil became dilated, generally widely dilated, the dilatation beginning in from a quarter to three-quarters of an hour, and continuing about twenty-four hours or a little longer.

So far as we can judge at present, from only a few careful observations, the dilatation very little interferes with the sight.

In some of our experiments it seemed to us that the doctored pupil contracted very slightly before it dilated, whilst in other cases both pupils certainly at first contracted somewhat. To test the early effect of the local application, we dropped some of the solution into a cat's eye, and watched the effect; but, although after a time the pupil widely dilated, we could not detect any initial contraction.

JABORANDI (Pilocarpine).

THIS active and interesting drug long in use in South America, was lately brought from Pernambuco to Paris by Dr. Continho, who recommended it as a powerful diaphoretic and sialagogue. Dr. Continho advises the patient to drink the infusion with the suspended leaves, then go to bed and cover himself with warm clothing. In about ten minutes, the face, ears, and neck become deeply flushed, and soon drops of perspiration break out over the body, whilst at the same time the mouth waters. In a short space of time the perspiration rapidly increases, the sweat running down the body and soaking the clothes, whilst the salivation becomes profuse, oozing from the mouth, sometimes in an almost continuous stream. The sweating and salivation persists from two to four or five hours. Occasionally it happens that perspiration fails to follow the medicine, and salivation is is more frequently absent; but when the drug fails to cause sweating it salivates, and *vice versâ*. The symptoms come on as I have said in about ten minutes, but sometimes if the external conditions are not favourable, the symptoms may be much delayed, and not appear for an hour or longer, and then, perhaps, are brought on by brisk exercise. Hypodermically injected the alkaloids act in three to five minutes.

The amount of saliva secreted may amount to a pint, or a pint and a half.

Langley shows that it produces salivation of the submaxillary gland even after section of the corda tympani nerve, and the sympathetic supplying this gland.

Pilocarpine promotes other secretions as the tears, the bronchial and intestinal secretions, though to a far less degree than the salivary and cutaneous secretion. Thus the eyes water slightly and sometimes there is a little running at the nose, and a slight loose cough; moreover, some observers state that it relaxes the bowels, an effect I have never witnessed in my numerous observations. In many cases these effects on the tears, &c., are absent.

During the sweating the body temperature falls from 0·4° to 1·4° Fah., the average in my observations conducted with Mr. Gould, being 0·9.° The depression lasts from one to four hours. This effect on the temperature is no doubt due to the perspiration, heat being lost by increased evaporation and radiation, more blood being probably sent to the skin during the sweating period.

In the human subject jaborandi always quickens the pulse, my original assertion on this point having been subsequently abundantly confirmed. Strange to say, Mr. Langley finds that it slows the heart of warm-blood animals and frogs, and as regards frogs I have repeatedly verified this statement. The pulse is increased in man from 40 to 50 beats, the accelerated rate continuing more than four hours, at the same time the pulse is weaker. Jaborandi slows, and at last arrests the heart of frogs, whether injected under the skin, or applied directly to the heart. The heart stops in wide diastole. If, when the heart is greatly slowed, or even stopped, a minute quantity of atropia is directly applied, the heart soon begins to beat again, and ultimately, quite or almost recovers from the effect of the pilocarpine. Mr. Langley's experiments lead him to conclude that jaborandi slows and arrests the heart by stimulating the same nervous apparatus that atropia paralyses, and so quickens the heart, namely, the intra-cardiac inhibitory apparatus.

It is curious that whilst jaborandi slows and arrests in diastole the heart of frogs, and, according to Langley, of warm-blooded animals; it greatly quickens the heart of man. We see the same contradiction in the action of atropia on man and the lower animals. Atropia quickens and strengthens the heart in man and horses, dogs, &c., whilst a full dose swallowed or topically applied arrests the frog's heart in diastole.

Jaborandi at first flushes and then pales the face. The pallor comes on when the sweating is active, showing that the sweating is not due to the excess of blood sent to the skin.

It often produces frontal headache, sometimes with giddiness and dulness. After the internal administration, the sight frequently becomes hazy, without any alteration in the size of the pupil. But the topical application to the eye as I have shown causes decided contraction of the pupil. Mr. Tweedy concludes from his investigations that jaborandi locally applied, causes, 1. contraction of the pupil; 2. tension of the accommodative apparatus of the eye, with approximation of the nearest and furthest points of distinct vision; 3. amblyopic impairment of vision from diminished sensibility of the retina. These effects, however, do not last long.

Jaborandi seems to be slightly narcotic, for patients often fell asleep during our experiments.

It not unfrequently excites sickness. This can, in part, be accounted for by the large quantity of saliva swallowed; often indeed the vomit consists solely of saliva.

In many cases jaborandi produces pain, often severe over the pubes with a distressing irrisistible desire to pass water, the pain at once subsiding on emptying the bladder. As the quantity of urine is not increased, it is probable that jaborandi excites contraction of the bladder.

From a few experiments I have made, I think it probable that jaborandi promotes the secretion of milk.

Jaborandi affects children far less easily than adults.

It is evident from the previous account, that there is a marked antagonism between atropia and pilocarpine. But in three respects they correspond, for both produce frontal headache, and infra pubic pain, with desire to pass water, and both affect children less than adults. In order to test the antagonism between these two drugs, I have, on many occasions, administered pilocarpine, and when the sweating was profuse, I have injected hypodermically grain $\frac{1}{100}$ of atropia and in five to ten minutes the skin became quite dry, and the salivation ceased. Strange to say, not only did atropia remove the antagonistic effects of pilocarpine, but likewise those symptoms common to both drugs, namely, headache and desire to pass water.

Though of great physiological interest, jaborandi has not yet proved very serviceable in the treatment of disease, though it has been recommended without adequate warrant in various diseases. Its action on the skin obviously suggests a trial in Bright's disease, and several observers have reported cases apparently benefited by it. I have used it in many cases, not only without benefit, but, I must confess, not without doing harm, for it has always much depressed the patient, has generally excited sickness, and the effects have been so disagreeable that in almost every case, the patient has begged the discontinuance of the treatment.

It may be administered in the form of infusion made with sixty or ninety grains of the powdered leaf, or as tincture, a drachm of which is equal to thirty grains of the leaf, but best as the alkaloid pilocarpine, of which half a grain to three quarters of a grain may be given by the stomach, or a quarter to half a grain hypodermically.

GELSEMIUM SEMPERVIRENS.

This powerful drug has long been employed in America. Its physiological action has been investigated by Dr. Roberts Bartholow, Dr. Ott and Dr. Berger.

In conjunction with Dr. Murrell I have made numerous observations regarding the physiological action of this drug. The following is a condensed account of our papers published in the *Lancet* for 1876 and 1877.

Gelsemium lately introduced into this country as a remedy for neuralgia, is especially useful in non-inflammatory toothache, and in neuralgia of the nerves supplying the teeth and the alveolar processes of the jaw.

Gelsemium is a powerful paralyser and respiratory poison. Its paralysing action is best studied in the frog. In these animals it often produces tetanus as well as paralysis. Whether we produce paralysis alone or paralysis followed by tetanus depends on the dose. Thus, as a rule, with small doses of the alkaloid we only get paralysis; with rather larger, quiverings and tetanoid movements; and only after large doses decided tetanus.

Is the paralysis due to the influence on the brain, the cord, the motor nerves, or the muscles?

It paralyses the spinal cord, the motor nerves and the muscles being unaffected.

The tetanus is due to the action of the poison on the cord, and I draw especial attention to the fact, that the paralysis of the cord always precedes the tetanus; that gelsemia (the alkaloid) has the property of first weakening and then tetanizing the cord, thus corresponding to jaborandi, buxus sempervirens and other drugs.

Gelsemium is a powerful respiratory poison; indeed, this drug generally if not always destroys warm blooded animals by asphyxia, before it produces complete paralysis. It produces no primary quickening of respiration, and does not paralyse the phrenic, nor the intercostal nerves, and it acts after the division of both vagi. It asphyxiates, as Dr. Burdon Sanderson has shown, by paralysing the automatic respiratory centre.

In order to test the effects of gelsemium on man, I gave it to six persons on seventeen occasions, in doses sufficient to produce decided toxic effects. The tincture used was made with one part of root to four of rectified spirit. To excite the symptoms characteristic of this drug, I found it generally necessary to give drachm doses hourly for three hours—a quantity which may be given with perfect safety. Some individuals, however, as might be expected, are much more prone to be affected than others. Thus, a woman suffered from diplopia headache and hazy sight after a second dose of ten minims; and in another case, two doses of twenty minims at two hours' interval produced well-marked symptoms presently to be described. On the other hand, I have given drachm doses hourly for six hours with very slight effect; and in one instance, I gave twenty minims to a delicate young woman every three hours for several days, finally causing only slight heaviness in the eyelids.

Unless given in dangerous doses, gelsemium affects first and chiefly the eyes and brows. The symptoms generally occur in a certain order; not without exceptions, however, both in the order and number of the symptoms. The drug ordinarily first produces pain in the brows, followed soon by giddiness, then by pain in the eyeballs, and soon after by dimness of sight. A larger dose produces double vision without apparent squinting, with a sensation of great heaviness in or under the upper eyelids, with somewhat contracted pupils. A still larger dose causes drooping of the upper lid, sometimes so marked that the edges become nearly closed, and can be opened only by a strong and painful effort; and after straining to open them, sometimes the upper eyelid is so tired that ptosis for a short time becomes complete. The movements of the eyeball are restricted, and associated in one case with a strong double internal squint. The patient next complains of weakness in his legs, and we have never pushed the drug beyond the production of this symptom. When decidedly under the drug's influence the patient is pale, with a heavy sleepy look. Some say their eyes feel sleepy; others yawn frequently, and say they can hardly keep awake, and when left to themselves fall asleep. Others complain of dryness of the mouth, though the tongue looks moist, and to the finger feels so. Some keep moistening the mouth with a little water even hours after the discontinuance of the medicine.

These symptoms, except the internal squinting, were all produced in the greatest number of cases; but in some instances even large doses of the tincture induced only a few of the slighter symptoms. Thus a woman took a drachm dose hourl for six hours without exciting headache, diplopia, or giddiness—only great heaviness of the eyes and dimness, almost amounting to temporary loss of sight; though on a former occasion, in this very woman, we produced extreme diplopia with giddiness with four one-drachm doses of the tincture. Diplopia as we have shown, is generally preceded by headache, giddiness, and dimness of sight; but in one instance diplopia occurred without these preliminary symptoms, though, strange to say, on a subsequent occasion, in this same woman, with a larger quantity—that is, six one-drachm doses hourly—we produced much giddiness and mistiness without diplopia.

The symptoms from gelsemium come on early and soon subside. A single drachm dose rarely produces any marked symptom, but in from ten minutes to a quarter of an hour after the second hourly dose the symptoms appear, and reach their highest point in about half an hour, and then quickly subside, most of them ceasing in about an hour. With the repetition of four or six hourly drachm doses the symptoms may persist six or eight hours after the last dose; but the symptoms are most marked half an hour after each dose, and then decline.

I shall now describe each symptom separately and fully.

Pain in the head and eyes.—Patients described this pain variously. It was generally limited to the forehead, and most marked just over the eyes. Some called it a dull sensation over the eyes; others, a heavy pain; others, a giddy pain; and one patient experienced pain over the occiput, with a sensation as if the crown of the head was being lifted off in two pieces. This headache was sometimes absent, sometimes followed instead of preceding the other symptoms. Dull aching pain in the eye-balls, now and then shooting in character, occasionally worse in one ball, sometimes followed and sometimes preceded the headache. The headache and pain in the eyeballs were often severe and were intensified on moving the eyes. When ptosis was well marked the effort to open the eyes widely caused considerable pain, and the patient seemed to get relief by closing his eyes.

Giddiness was another prominent and early symptom. Some felt it over the whole head, but by far the larger number said it was limited to the brows. Standing or walking made it much worse. When well marked the patients staggered, and were afraid even to stand, much less walk. So giddy was one patient that he nearly fell off the form. Some described their heads as going round and round. They felt and seemed drunk, though without any incoherence, or mental excitement.

Sight.—In every case the sight was affected; indeed, dimness of sight and giddiness appear to be the most constant symptoms, and may exist without headache, pain in the eyeballs, or double vision. At first the sight, without being misty, is not so clear as usual; then slight mist comes before the eyes, one patient comparing it to a "lot of smoke rising before his eyes," and another to a "thick veil." At last the sight becomes so affected that it fails almost completely, failing first with distant objects; then, with further impairment of vision, nearer and nearer objects look hazy. Gelsemium affects too, the sight in animals. Thus we poisoned a dog, and, after the production of slight muscular weakness, the sight became almost lost, for the animal ran straight against objects without trying to avoid them, evidently not seeing them.

Diplopia.—The drug seems to produce two kinds of diplopia, one much more persistent than the other. As to the transient kind, we find it on many occasions a very passing phenomenon, lasting only a few seconds, then disappearing, then, after a few minutes, reappearing. In this transient form images in the median vertical line appear double, distant objects at first undergoing the duplication. Sometimes the patient was conscious of the onset of the diplopia: thus one woman said, "I know it is now coming on; I feel such a heavy weight under my upper eyelid." The double vision then came on and with the heaviness passed away in a few seconds. One image was higher than the other; the images in this respect varying much. Mr. T. Fox rapidly recorded from the patient's lips, the phenomena occurring as fast as they could be written:—One gas jet appears about six inches above the other, and there are six inches between them horizontally; the upper one is to the left; now the right is uppermost; now the left slightly again; going over to right now again; exactly over one another now, and quite close together; now again separated, left the highest; now over one another." With other patients the two images seem on a level. Sometimes the drug produces only this transient kind of diplopia; at other times both kinds; and sometimes one kind preceded the other, the transient usually preceding the more constant form, recurring from time to time, while the constant form persisted.

The phenomena of the constant form of diplopia follow a definite order, and take place in the upper half only of the field of vision. They occur first with objects held at the extreme right or left of the visual field; and, as the patient passes more under the influence of the drug, then with objects held nearer and nearer the middle line; and at last, usually for a short time only, objects in the median vertical plane seem double. As the effect of the drug wears off, the double vision disappears in the inverse order. The outer lateral image is the higher, and the further the object is carried to the right or left the greater is the horizontal and vertical distance between the images. When a coloured glass is placed before either eye the outer and higher image is seen by the covered eye. When the object, is carried high above the head, the two images gradually coalesce, and the object looks very much thinner, "like a thread." With well-developed diplopia there is impaired movement of the eyeball, chiefly affecting, as far as could be ascertained, the external and internal rectus, especially the external, for the outward and inward movement of the eyeball is less free than before the action of the medicine. The ball appears to be moved by a greater effort, so that when carried as far as the weakened muscles are capable, it oscillates; as though the patient with a great effort moved it as far as he could, and then the tired muscles gave way a little, but being roused to an effort they carried the eye back again; the frequent repetition of this effort giving rise to an oscillation.

The external rectus is generally first affected, and not infrequently one external rectus sooner than, and in excess of, the other. Even when the diplopia is strongly marked, the loss of power over the muscles is not very great, and there is no obvious squinting. (We may remark here that we could not detect any squinting during the transient form of diplopia.) Then, as the patient becomes still more affected, ptosis supervenes, and a great part or the whole of the upper half of the field of vision is cut off. The loss of power in the eye muscles is then more marked, but without the occurrence of obvious squinting. At this time the symptoms no longer follow the order previously described, but assume various forms, often changing rapidly. Thus, whilst on one side the outer image is the higher, if the object is carried to the other side of the field the inner image becomes the higher; or, perhaps, for the first few seconds the outer and then the inner is the higher.

To test the effect of gelsemium on the circulation I made thirty-three series of observations on patients in whom we induced the full toxic effects. The observations were taken every quarter of an hour whilst the patient was fully under the influence of the gelsemium, and subsequently, as its effects began to decline, at hourly intervals. In twenty-two out of thirty-three series of observations the pulse remained unaffected in frequency, whilst in the remaining eleven it was quickened, the increase ranging from six to twelve beats in the minute. Curiously enough, even in the same patients, the effects were variable, for although the drug quickened the pulse on some occasions, on others it failed to affect it. This was not a mere question of dose, for an increase in the dose did not affect the result. With a patient fully under the influence of the drug we were inclined to think that the pulse became a little smaller and softer. These observations show that gelsemium produces little if any effect upon the circulation; a conclusion confirmed by observations on the lower animals.

Dr. Burdon Sanderson concludes from a kymographic experiment on a rabbit, that gelsemium exerts no influence on the blood pressure.

Gelsemium acts less powerfully upon the respiratory centre in man than in the lower animals, or, perhaps, to speak more accurately, we should say that in the human subject other parts of the nervous system are affected before the respiratory tract. Thus, in man, the drug produces giddiness, pain in the head, loss of sight, diplopia, and ptosis, before respiration is in any way affected. The ptosis may be so complete that the eyes cannot be opened, and the sight may be temporarily almost destroyed, yet the breathing will not be altered in character, or, at all events, will become only slightly more superficial. It may be said that the symptoms we have enumerated may have been overlooked in the lower animals. I, of course, cannot answer for the pain in the head and giddiness, but I am enabled to speak positively as to the absence of ptosis. I frequently noticed that when an animal was so fully under the influence of the drug as to be on its side in a condition of absolute helplessness, it was still able to open its eyes widely, apparently without the slightest effort.

In the lower animals gelsemium, as we have seen, acts first on the respiratory centre, then on the spinal cord. In man, however, the muscles of the upper eyelids, or more probably their motor nerves, are considerably affected before either the cord or respiratory centre. Moreover, if the cases of poisoning are correctly reported, we are justified in concluding that in man the drug acts upon the spinal cord before it involves the respiratory centre, for in several instances it is recorded that the patient has recovered from a condition of complete paralysis. In my experiments on cats, rabbits, and dogs, we found that the animal died from asphyxia before there was any great impairment of voluntary power.

Gelsemium, as I have already stated, has been highly praised in the treatment of cough. For practical purposes we recognise three different kinds of cough:—

1. Where the expectoration is free, but the cough is not in excess of the expectoration.

2. Where the power of expectorating is diminished, as in emphysema and fibroid degeneration of the lung. In fibroid degeneration, owing to the great induration and thickening of the pleura, there is little or no expansion, and the air cannot be drawn into the small bronchial tubes behind the mucus, which is consequently not expelled. In these cases, although the expectoration is slight, the cough is often troublesome, and not infrequently very violent.

3. Where there is excessive excitability of the respiratory centre, and a small secretion of mucus consequently suffices to set up violent and frequent cough.

The main object of our treatment is in every case to diminish the secretion of the mucus in the bronchial tubes. This method must be chiefly relied on in the first and second varieties. In the third we must have recourse to the administration of sedatives, and ether, chloroform, opium, and gelsemium will be found beneficial.

I have carefully watched for, but have been unable to detect, any influence on the mental faculties. Patients when under the influence of gelsemium look dull and heavy from the drooping eyelids, and often feel sleepy, but when asked if they are conscious of any mental depression they always answer decidedly in the negative. Nor is cutaneous sensibility affected. I have tested sensibility roughly by pricking the skin and pinching, and also in two cases by the use of the compasses, but was unable to detect any loss of sensation, either in the face or forearm, although the patients to whom I have more especially referred had taken for six consecutive hours drachm doses of the tincture and were fully under the influence of the drug. I was led to pay particular attention to the action of gelsemium on the gums from the success which has attended its administration in neuralgia of these parts. One patient on both occasions on which I experimented on him complained spontaneously of a numb pain, and a little tenderness along the teeth and the edges of the gums of the upper jaw. I have never, however, in any case been enabled to detect, either by pinching or by the use of sharp instruments, any loss of sensation in the parts.

Gelsemium, in the doses in which I have employed it, does not affect the temperature. In the first place I made two sets of observations, both on the same man. On each occasion he took drachm doses of the tincture hourly for four hours, and his symptoms were marked and characteristic. The temperature was taken on one occasion every quarter of an hour, and on the other every half hour or every hour, and the observations lasted respectively five and six hours. In one experiment it rose 0·2° F., and in the other 0.4° F., during the course of the observation. It is true in the evening the temperature fell, but this occurs naturally, and in these cases was probably due to the ordinary diurnal variation. I also tested the effect on the temperature in a little girl aged nine, who was suffering from chorea. On the first day I gave twenty-minim doses of the tincture every hour for three hours, without producing any constitutional effects, and the rectal temperature remained unchanged. On the following day I gave for five hours an hourly dose of forty, thirty, twenty, and thirty minims respectively, and produced well-marked constitutional effects. The temperature was taken hourly in the rectum, and on two occasions was 0·4° F. lower, but after the fifth dose it was the same as before the medicine was given.

In addition to these observations on patients, I made six temperature experiments on rabbits, but the results obtained were simply *nil*. I soon found—a fact with which I was previously acquainted—that in these animals fright exerts a marked influence on the temperature. The mere holding the animals legs or placing it on its side with a view of introducing the thermometer into the rectum will rapidly reduce the temperature by two degrees. My conclusions on the point in question have consequently been drawn entirely from observations on patients.

Strange to say, the effect of an internal dose of gelsemium, is opposite to that occasioned by its application to the eye itself. When given by the mouth, in doses sufficient to produce symptoms, the drug in every instance but one, caused contraction of the pupil; indeed, in the case in which the drug produced weakness of the legs, with a strong double internal squint, the pupils were contracted to a pin's point. In the exceptional patient just referred to, on whom I made two observations, though on each occasion I produced great giddiness, haziness, susceptibility to light, and diplopia, the pupils did not contract, but manifested a very unsteady condition, varying greatly in size, in rapid alternation without any apparent cause. In another patient, the pupils strongly contracted when exposed to light, but they dilated freely in a darkened room, and when they recontracted on exposure to light, they seemed in an unstable condition, oscillating a good deal. The contraction of the pupil does not cease, on the disappearance of diplopia or dimness, indeed, when the dimness passes away, the contraction of the pupil may increase.

In the cases of accidental poisoning, it is recorded that during complete general paralysis the pupils are widely dilated, whence it might be inferred that the condition of the pupil depends on the dose—a moderate dose contracting, a very large one dilating the pupil. This inference is possibly in part true, but the dilatation may be due likewise to the asphyxia, consequent on large doses. Dr. O. Berger finds, and my observations confirm his statements, that dilatation of the pupils in poisoned animals, occurs only when asphyxia from paralysis of respiration has set in, and that artificial respiration at once causes the pupils to contract.

On the other hand, the topical application to the eye dilates the pupil. In the first instance I employed a tincture (1 in 10) of the American liquid extract. These preparations dilate the pupil slightly, but they excite great irritation. Subsequently I employed the alkaloid prepared by Mr. Gerrard—one grain in twenty minims of water, a solution which causes scarcely any smarting. Mr. T. Fox and Mr. Sydney Pearse made for me nineteen observations. A few drops of the solution were put into one eye, and in eac case this trial pupil became widely dilated, the dilatation usually beginning in about thirty minutes. Not only does the pupil dilate, but the muscle of accommodation becomes paralysed, and the sight affected, the vision again becomes nearly natural in twenty-four hours, but the pupil remains dilated much longer —sometimes, indeed, for a week, or even a fortnight.

The fact that the internal administration contracts the pupil, led me to examine carefully whether the local application to the eye causes any primary contraction; and in three instances I thought I detected very slight contraction, lasting only a few minutes.

The local application also dilates the pupil of rabbits and cats. The pupil of a cat being extremely sensitive I thought that if the local application did cause primary contraction, I should detect it best in this animal. In five observations h[illegible] pupil in each instance became decidedly contracted before [illegible]ng. In one instance the contraction began in two minutes, in another it was delayed fifteen minutes; the average time being ten minutes. Its average duration was twenty-four minutes, and it was followed by wide dilatation.

I have said that the local application dilates the pupils, but I must add that in rabbits absorption sometimes takes place so readily, and these animals are so easily affected by the poison, that they become asphyxiated, and die before the pupil has time to dilate. The contracted pupils due to the internal administration of the drug, and the dilated pupils due to its local application, are both associated with dimness of sight.

I have seen that the internal administration of gelsemium contracts the pupil in man and the lower animals, and that dilatation occurs only on the supervention of asphyxia, which at once disappears on the employment of artificial respiration; showing that this dilatation is due to the asphyxia and not to the drug. It occurred to me that the internal administration would probably dilate the pupil, but that a dose adequate to produce this effect so quickly paralyses the respiratory centre, that the animal dies asphyxiated before the drug has time to dilate the pupils. To ascertain the validity of our conjecture, I made a rabbit insensible with seven grains of chloral, then inserted a cannula into its trachea, and injected into the subcutaneous tissue of the axilla thirty drops of the liquid extract, and at once commenced artificial respiration, to prevent the advent of any asphyxia. In seventeen minutes I thought the pupils were a little contracted; in twenty-six minutes well-marked signs of paralysis set in, shown at first by a difficulty in keeping up the head; in half an hour the animal could not raise its head off the table, whilst it still retained considerable power over its trunk and extremities. At this point the eyes became prominent and the pupils began to dilate, and in thirty-four minutes the animal tumbled over on its side, and then I noticed that the pupils were decidedly larger and the eyes more prominent; but as at the expiration of an hour the pupil had not become widely dilated, I repeated the thirty minims of liquid extract, injecting it in two places into the subcutaneous tissue. Paralysis rapidly increased till it was complete in the anterior part of the body, though still the rabbit had considerable power over its hind legs; but at last these also became almost completely paralysed, and the animal lay on its side in a helpless state. As the paralysis advanced the pupil dilated somewhat, till at last it became above double its original size, though it never reached the degree of dilatation observable in man and cats after the local application of the alkaloid. I noticed that the animal retained the power of closing its eyes quickly and strongly, even after almost complete general paralysis, whence I conclude that the seventh or some of its branches is one of the last nerves to undergo paralysis. While performing this experiment I noticed that the anterior part of the body was first and most severely paralysed, for after the anterior limbs were almost helpless the animal retained a good deal of power over the posterior extremities, which likewise at last became helpless.

On another occasion I repeated this experiment, and continued artificial respiration for two hours and ten minutes. During this time I injected under the skin a drachm of the liquid extract three times, completely paralysing the rabbit. A first the pupils became slightly contracted, but under the full effect of the drug they were slightly dilated. This experiment shows clearly that the internal administration of a large dose will dilate the pupil, though not considerably.

I have seen that gelsemium internally administered, at firs contracts and then somewhat dilates the pupils, and that it dilates them when locally applied. How does it produce these effects? Through the third nerve or through its influence on the sympathetic? I am unable to answer these questions, and I shall rather indicate the difficulties to be contended with than hope to explain them.

Assuming that gelsemium first stimulates and then paralyses the third, it would seem that its action can thus be readily explained; but a little consideration will show that this view is inadequate. Thus we find that the internal administration contracts the pupil—due, we assume, to the stimulation of the third nerve; but this contraction persists even when the muscular branches of the third are paralysed. It may be said that to paralyse the branch of the third supplying the iris, a larger dose is required than is needed to paralyse the branches supplying the recti and other muscles, and hence, whilst these muscles are paralysed the pupil continues contracted. But this supposition is inadequate to explain why the topical application should widely dilate the pupil without paralysing the muscles. We are forced to accept the feasible assumption that, topically applied, gelsemium has a stronger affinity for the termination of the branches of the third supplying the iris than for the branches distributed to the orbital muscles.

I have tried gelsemium with decided success in several cases of neuralgia of the dental nerves, even when the teeth were carious. Unfortunately, in several cases, the necessary dose to relieve pain produced much giddiness, haziness, and sometimes sleepiness, a considerable drawback to the usefulness of the medicine. In some instances ten minims three times a day produced these toxic symptoms. To a girl of fourteen, suffering with neuralgia of the supra-orbital branch of the fifth, I gave ten minims of the tincture three times a day, and each dose produced complete ptosis of the neuralgic eye, lasting an hour or longer.

GRINDELIA ROBUSTA.

This composite plant has acquired a considerable reputation in America, where it is used as an antidote in poisoning by the rhus toxicodendron, and as a remedy in asthma, and in allied diseases. Mr. Martindale of New Cavendish Street has introduced this remedy into this country. His preparation of the liquid extract has proved, in many cases, so serviceable that, although my own experience with respect to it has been slight, it is so far favourable that, coupled with the strong testimony I hear from medical friends, I am induced to give a brief account of this plant in the present edition.

This is employed in two ways. Some give it in three grain doses of the extract thrice daily to prevent an asthmatic attack; others give it to cut short the attack in twenty to thirty minim doses of the liquid extract every half hour, or hourly, begininng at the very onset of the paroxysm.

THERAPEUTICS OF BELLADONNA.

Certain animals, like pigeons, and rabbits, appear to be almost insusceptible to the influence of belladonna. Dr. Horatio Wood has shown that the local application of belladonna does not dilate the pupils of pigeons, which supplements Wharton Jones' observation that when administered internally, the drug has no effect on the eye. Stramonium and hyoscyamus, as well as belladonna have very little action on pigeons, and it is indeed almost impossible to kill them with these substances. Two grains of atropia administered hypodermically, are required to kill a pigeon, and Calmus found that fifteen grains are required to kill a rabbit. It is said that vegetable feeders are but little affected by belladonna, but that it is a powerful poison to flesh eaters; thus belladonna, it is asserted, has very little effect on horses and donkeys.

The preparations of belladonna are in frequent use for external applications; no other applications are so effective for the relief of pleurodynia and the hyper-sensitiveness of the skin and irritability of the muscles of the chest in phthisis, as the liniment or plaster of belladonna. The liniment is preferable to the plaster, being stronger and cleaner, and should be rubbed over the tender and painful part several times daily, according to the severity of the pain. Although as a rule the liniment is preferable, yet in certain cases of pleurodynia the constant application of the plaster gives more relief. The liniment of belladonna, or the ointment of its alkaloid, is sometimes used in facial neuralgia.

Myalgia, so admirably described by Dr. Inman, often yields to belladonna, although opium preparations, as the linimentum saponis cum opio, sometimes succeed better.

An attack of lumbago that has perhaps affected the whole loins, often leaves behind it one painful spot, which may distress the patient only when the body is moved in one direction. This remnant of lumbago generally resists the usual methods of treatment, and is perhaps, driven from one spot only to reappear at another; but a large belladonna plaster will generally relieve or altogether remove such pain.

Belladonna employed either internally or externally checks and even suppresses the secretion of the glands. This is true of the mammary, sudoriparous and salivary glands, and possibly of other glands. It is well known that belladonna will arrest the secretion of milk, and that it is employed with great advantage when, from any cause, a mother being unable to suckle her child, the breasts become swollen, exquisitely painful, and threaten to inflame and suppurate, unless the tension of the ducts is relieved. If the milk cannot be drawn off artificially the secretion must be suppressed by means of belladonna which should be applied early, before inflammation has set in, and then, in a few hours, the swollen painful breast gradually diminishes, and soon becomes soft, comfortable, and painless. But if inflammation has set in, and the breasts become tense, shiny, hard, knotty, red and acutely painful, the continuous application of belladonna for twenty-four or forty-eight hours will often remove the inflammation and tension and arrest impending abscess. The rapid relief it gives in these cases will greatly astonish anyone unaccustomed to its use; in fact it is impossible to overstate the usefulness of belladonna. It should be employed in all cases, no matter how far the inflammation has advanced, and it will often arrest the progress of an abscess otherwise almost certain to maturate. Even when it fails to prevent suppuration, yet it will reduce inflammation, subdue much of the pain, and greatly limit the inevitable abscess.

The liniment, the extract mixed with an equal quantity of glycerine, the ointment, or a drachm of the tincture to an ounce of olive oil, or two drachms of the liniment mixed with an ounce of lard should be rubbed especially over the areola around the nipple. The liniment is speedily effectual.

Frequent fomentation with very hot water, unless cooler water should be found more agreeable and soothing, is an excellent adjunct, but the nurse must be cautioned to wipe the skin perfectly dry or the friction with the liniment will perhaps produce a sore.

Belladonna will arrest not only the secretion of milk, but the secretion of perspiration. A man forty-five years old had been troubled for many months with profuse sweating of the right side of the face and neck, which used to break out on the slightest exertion, or when near a fire, or if excited, so that the perspiration ran down his face and neck in streams, soaking his collar and the band of his shirt. His face was neither red nor injected, but the sweat produced an abundant crop of miliary vesicles strictly limited to one half the face. The liniment of belladonna, applied two or three times a day considerably abated this excessive sweating and reduced it to little more than the natural amount.

The effect of belladonna in this instance led me to test its influence over other kinds of sweating. If used twice or thrice a day, the liniment will completely check the sweating that soaks the pillows and bedews the heads and faces of young children who have been sleeping. After a few days the application may be discontinued and there will be no return of the perspiration. Again, many healthy adults are troubled all their lives with profuse sweating of the hands or feet sometimes so copious as to run off in drops, and especially noticeable at the tips of the fingers and the ball of the thumb. Belladonna liniment, rubbed into the hands three or four times a day, will often gradually diminish and sometimes completely arrest this annoying affection, although, no doubt, there are cases in which the treatment fails. The sweating may, at least, be arrested for a considerable time and sometimes the good effects are permanent.

Since the first publication of the foregoing remarks, I have made many fresh observations confirming the efficacy of belladonna to check sweating. Thus, a patient, who all her life had suffered from profuse sweating of the left side of the body, completely checked the sweating by rubbing belladonna ointment into the face twice or three times a day. Again, in cases of local sweating of the loins, over a surface a little larger than the hand, the perspiration exciting a copious eruption of eczema, belladonna checked the perspiration, and likewise cured the eczema.

Many experiments of the following kind were instituted. On several occasions a patient, after undergoing a sweating in the hot air bath, was rubbed on one side of the face for a quarter of an hour three times a day for two or three days with belladonna ointment. The bath of the same temperature and duration was then repeated, when it was observed that the sweating both during the process and after was very greatly lessened; also the effect was general, although the ointment was applied only to one side of the face. In some cases the ointment was rubbed into the chest, but the effects were much less marked than when applied to the face, possibly because less ointment was absorbed.

As the local application checked sweating over the whole body, it was supposed that it acted by absorption, and this led to the internal administration of belladonna. The repressive effect, however, was apparently decidedly less than when locally applied, possibly because the amount of the drug swallowed was less than that absorbed by the skin. Still no doubt the internal administration of belladonna does effectually control sweating, particularly in the case of weakly children perspiring profusely after exertion and whilst sleeping. In the curious case of a middle-aged man, who, after much mental worry, suffered from excessive sweating of both cheeks while eating—the tendency being promoted by hot meat or vinegar—the sweating ceasing immediately after the meal, ten drops of tincture of belladonna, thrice daily, checked the sweating completely. This man passed at times a profuse quantity of pale urine.

Employed hypodermically, atropia promptly checks sweating. After repeated experiments I find that in profuse sweating, produced by the hot chamber of the Turkish bath, one one-hundredth or one two-hundredth of a grain of atropia will, in a few seconds, completely dry the skin and maintain it dry, notwithstanding the continuance of the bath. These experiments led me to employ belladonna hypodermically in the sweating of phthisis and other exhausting diseases, and I found that one one-hundredth or even one two-hundredth of a grain would generally arrest the sweating, sometimes for more than one night; and that in phthisis it made the patient sleep better and quieted the cough. Dr. Murrell made, at my request, sixty experiments on phthisical patients, and he finds that the drug, equally successful with men and women, in febrile and non-febrile cases, in the prostrate and comparatively strong, fails in about from

8 to 10 per cent. Sometimes its effects are delayed: thus, if administered at bed-time, it may not check sweating till the following night; or its beneficial influence may extend over several nights, then gradually wear off, so that each night the perspiration returns a little earlier. In a few cases it permanently checks the sweating. This treatment unfortunately produces disagreeable dryness of the throat; but as many phthisical patients suffer in this way, the slight increase of the dryness due to the atropia is scarcely noticeable.

Dr. Fothergill has given atropia in the sweating of phthisis with marked success. By checking the sweating the strength of the patient is economised,' by preventing, he suggests, the loss of the large quantities of salts which escape with the sweat. He gives one-seventieth to one-fiftieth of a grain of this drug, in a pill at bed-time; but owing to idiosyncrasy this dose must sometimes be increased even to one-twentieth of a grain. Thus administered, he says the atropia does not dry the throat nor affect the brain, nor produce any undesirable symptoms.

The occurrence of sweating often suggests treatment or assists the prognosis. The two chief causes of sweating are weakness and a fall in a febrile temperature. These two causes are often combined in the same individual in exhausting febrile diseases as in phthisis.

The readiness to perspire in a non-febrile patient often indicates weakness and even measures its amount: thus a person in depressed health, finds that exertion, even when slight, or any excitement causes too free sweating. A trainer knows well that a trainee is in bad condition when he perspires too freely.

Again, in exhausting diseases, and during the weakness of convalescence, slight exertion or sleep produces sweating, often profuse. It must, however, be borne in mind, that great differences in respect to the amount of sweating are met with in different individuals in sound health. A person returning from a residence in a hot climate where he has habitually perspired very freely, finds on return to a colder climate that he still continues to perspire very readily under slight exertion. During the sudden fall of a febrile temperature, as in the sweating stage of ague, or during the fall of temperature ofter a rigor in pyæmia, profuse sweating occurs; many phthisical patients too in whom there occurs a great diurnal variation of temperature, this rising to 102° or higher at night and falling in the early morning hours, undergo with this fall a drenching perspiration. The amount of sweating in febrile cases depends on the extent of the fall of the temperature and the weakness of the patient; where the weakness is great, the sweating is often profuse, though the fall in the temperature may measure only two degrees or less.

These two forms of perspiration when not combined can be easily discriminated. Except in the case of pyæmia, there occurs in febrile diseases only once daily a rise and a fall of temperature, and consequently sweating when due to a fall in a febrile temperature occurs only once daily, and chiefly in the early morning. In weakness on the other hand, sweating breaks out at any hour of the day, and many times a day, being occasioned by exertion, sleep or excitement.

In my experience, profuse sweating as a rule is more common and lasts longer in the convalescence from scarlet fever than in other acute febrile disease; hence, sudamina in large crops often occur during the recovery from scarlet fever, greatly hastening desquamation sometimes in large patches of skin.

With the exception of rheumatic fever, profuse sweating at the commencement of an acute febrile disease, where the temperature remains permanently high, indicates great weakness, and adds to the seriousness of the prognosis; when with the profuse sweating, there is duskiness of the face, ears, and skin under the nails, showing weak circulation from enfeeblement of the heart, the serious aspect of the case is comfirmed and strengthened. Again, the feel of the skin shows the condition of a patient. If with much perspiration, the skin is soft and sodden, this shows general weakness, a state accompanied with a soft, perhaps large but compressible pulse, and these signs often point to the use of of alcoholic stimulants.

Belladonna checks the secretion of the abundant foul-smelling sweat from the feet. In making the liniment eau de Cologne may be used instead of simple spirit.

In checking sweating about the head and face, too much liniment should not be applied at one time, or becoming absorbed, it will dilate the pupil and obscure the sight.

In the cases just described, it was experimentally proved, that the effects are due to the belladonna and not to the spirit.

Belladonna checks salivary secretion, and induces dryness of the mouth and throat.

The salivary glands are supplied by nerves derived from the seventh. That part proceeding to the submaxillary gland runs incorporate with the chorda tympani nerve.—Through this nerve, the submaxillary gland is stimulated to secretion. Thus, if an acid is placed on the tongue, the secretion from this gland becomes abundant; but if the chorda tympani nerve is divided, acids applied to the tongue or mucous membrane of the mouth fail to produce this secretion. If the distal end is electrically stimulated we produce the same effects as the application of an acid to the mouth; thus, the arteries leading to the submaxillary gland enlarge and the blood passes so quickly through the gland, that its veins pulsate and become filled with arterial blood, whilst an abundant secretion pours forth from the gland. If atropia is given to the animal, neither acids to the mouth nor stimulation of the chorda tympani will excite submaxillary secretion. How is this arrest produced? Does the belladonna prevent the flow of a sufficient supply of blood to the gland and so arrest secretion? This view formerly accepted is now held to be erroneous, for though atropia will diminish the blood supply, still if the chorda tympani nerve is stimulated, the vessels dilate, and abundant blood is sent to the gland without augmenting the secretion; hence the action of atropia is not due to its paralysing effect on the vaso dilator fibres of the chorda tympani; and it is inferred that this nerve also contains fibres distributed to the cells of the gland, in fact secretory fibres, and that belladonna paralyses these fibres of the chorda tympani. I would point out that atropia may possibly act directly on the gland cells, this hypothesis explaining the foregoing facts as satisfactorily as does the assumption of the existence of secretory fibres.

These secretory nerve fibres are supposed to prove or, at all events, to tend to support the notion of the existence of trophic nerves, nerves endowed with the power to increase nutrition. Now I venture to suggest some considerations tending to show that the existence of fibres having the power to excite secretion, does not necessarily imply the existence of nerve indued with the function of promoting nutrition.

Amongst its other inherent properties, protoplasm is endowed with the power of assimilating nutritive matter and converting it into protoplasm. During the evolution of living beings, it has come to pass that in the higher animals, special portions of the protoplasm, have been set apart for the manifestation of some only of the fundamental properties of protoplasm, as irritability, secretion, respiration, or reproduction, to the exclusion or, at least, to the complete subordination of other properties (Foster's *Physiology*). But whilst granting this, yet each differentiated portion of protoplasm retains its property of assimilating nutritive matter. As the differentiated organs lie at a distance from the part where the needful stimulus to exciting their function is situated, the nerves were evolved to convey this stimulus, their function being to arouse the various organs into activity, and to convert the potential force stored up by nutrition into kinetic force; in other words, to develope their differentiated properties.

By way of illustration an impression on a part of the skin, say the leg of a frog, is conducted to the cord and is reflected thence to the muscles, producing muscular contraction; this contraction being accompanied by the destruction of a certain amount of the tissues of the contracting muscle. So it is with the salivary secretion: a stimulus to the mucous membrane of the mouth conducted to the central nervous system, is reflected to the salivary glands and stimulates secretion, which, like muscular contraction, involves loss of structure in the secreting gland; in each case, therefore, the nerves merely excite functional activity, with destruction of material in the exercised protoplasm. It is assumed that the nervous energy conducted along the chorda tympani nerve, excites the growth of the gland elements. I doubt the validity of this assumption. It seems to me that the nervous energy, as I have said, simply rouses the gland into activity, that it causes the gland elements to retrograde and produce their secretion, this destruction being followed by increased growth. The same order of events occurs in the case of a motor nerve and muscle, the nerve excites the muscle to contract, and this involves destruction of part of its structure, this destruction immediately induces an increase in nutrition whereby the loss is restored; hence, I submit it is as valid to assert that the motor nerves are the trophic nerves of the muscles, as that the chorda tympani is the trophic nerve of the submaxillary gland. In both, the nerves excite function with loss of structure, to be followed by increased nutrition. Both nerves secondarily do induce increased nutrition, yet cannot be designated trophic nerves.

Dr. Cook has recently reported cases of salivation from mercury and scurvy, cured by the hypodermic injection of atropia.

Recollecting that in acne there is over-abundant secretion from the sebaceous follicle, I was induced to use belladonna with the hope of checking it, and indeed this treatment seemed to be of some slight service.

While speaking of milk abscesses it was stated that, apart from its milk-arresting power, belladonna will in some measure subdue inflammation and its accompanying pain. Belladonna too is effectual in other forms of inflammation which threaten to end in abscess. Mr. Christopher Heath has shown that belladonna will prevent the formation of abscesses in the neck and elsewhere, and after the onset of suppuration will check pain and inflammation. The belladonna treatment of boils and carbuncles often succeeds. (See sulphides and poultices).

Belladonna preparations are of further use as local applications. Thus, the extract smeared over the painful cracks in the mucous membrane, is employed to relieve the pain of fissure of the anus.*

The extract in conjunction with tannin, in the proportion of one or two grains of extract to six or eight of tannin, is recommended by Trousseau in leucorrhœa with ulceration of the os uteri, and in neuralgia of the uterus. The belladonna arrests the too abundant secretion from the mucous glands while its action in this respect is assisted by the tannin. In both affections belladonna is serviceable in relieving pain. The mixture of belladonna and tannin may be wrapped in cotton-wool, or made into a bolus with cocoa-nut fat, and placed in contact with the painful and over-secreting os. Some obstinate forms of leucorrhœa yield completely to this treatment.

When the disease depends on too free a secretion of the mucous glands about the os uteri, and when this condition is associated with much pain, the following injection yields good results:—bicarbonate of soda, a drachm; tr. of belladonna, two ounces; water, a pint. The syringe should be introduced as far as possible, while the patient lies on her back, with her buttocks raised by a pillow while one or two syringefuls, used cold, should be injected into the vagina, and made to reach the mouth of the uterus. The position should be maintained for a few minutes, so as to allow the wash to remain in contact with the os uteri.

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* M. Maisonneuve employs forcible distention of the rectum in these cases with considerable success; by forcing two or more fingers up the rectum he overcomes the spasm and gives permanent relief.

Dr. Anstie has recently recommended atropia in hypodermic injection, to relieve local pain and spasm. He vouches for its great efficacy.—"It should be employed," he says, "in the form of solution of the sulphate, four minims containing one-sixtieth part of a grain; two minims will be the proper commencing dose in adults, unless the pain to be relieved be very severe. It should be cautiously increased to one-sixtieth or one-fiftieth part of a grain, more can seldom be needed." He further states, "it is somewhat less frequently tolerated than morphia, but persons quite unable to bear morphia will often bear atropine, and *vice versâ.*" He agrees with Hunter that when this drug does succeed, its effects are more permanent than those produced by the hypodermic injection of morphia. Dr. Anstie has satisfactorily employed atropia hypodermically, in one case of asthma and in two cases of glaucoma. The same treatment is sometimes useful in neuralgia and sciatica, although the pain of these affections is generally more easily subdued by morphia.

Dropped into the eye, applied to the surrounding skin, or introduced into the stomach, preparations of belladonna very speedily produce extreme dilation of the pupil. This dilation is one of the most characteristic symptoms of belladonna. In iritis and some other eye-diseases, solutions of atropia are used to produce dilatation of the pupil, and to prepare the eye for ophthalmoscopic examination. In conjunctivitis and other inflammations of the eye, belladonna is employed both locally and internally.

The local application of the liniment or ointment of belladonna will often relieve and sometimes even cure neuralgia. Its efficacy is most manifest on the fifth nerve, as in neuralgia of the brow or under the eye accompanied by severe pains in the eyeball and intolerance of light. Sciatica even will sometimes succumb to it.

A full dose of belladonna produces great dryness of the tongue and roof of the mouth, extending down the pharynx and larynx, inducing consequently some difficulty in swallowing, together with hoarseness, and even dry cough; a large dose will sometimes induce dryness of the Schneiderian membrane, and dryness and much injection of the conjunctiva.

"After about two hours" says Dr. J. Harley, "the dryness of the mouth gives way, to be replaced by a viscid, sticky, acid and foul-smelling secretion, and the mucous membrane becomes clammy, and the tongue is covered with a white fur." Harley produced ophthalmia in a dog by belladonna. Several of these symptoms indicate the influence of belladonna in arresting secretion.

In several instances, Harley has known belladonna to cleanse and moisten the tongue of typhus fever patients. Belladonna is employed in several inflammatory diseases of the throat, and its good effects are most apparent when the throat and tonsils are acutely inflamed and swollen. It may be given in combination with aconite, and the influence of aconite on this form of inflamed throat, provided the pulse is full and the skin hot and dry, is greater than that of belladonna.

The influence of belladonna on digestion is not known.

In some painful affections of the stomach the tincture may afford relief—a vague statement, but as exact as our present knowledge of the drug will permit. I have heard it praised in "gout of the stomach." Twenty or thirty minims of the tincture administered every three or four hours, has arrested obstinate forms of the vomiting of pregnancy.

It is not yet ascertained in what way belladonna affects the intestines; but bearing in mind its influence on the lining membrane of the mouth it may be conjectured that belladonna lessens the secretion of the intestinal canal. It has been asserted that belladonna increases the peristaltic movement of this canal. It has been experimentally proved that it paralyses the terminations of the inhibitory fibres of the splanchnics distributed to the intestines. Thus stimulation of the splanchnics will stop intestinal movement, but small doses of atropia will prevent this arrest.

Trousseau recommended belladonna in obstinate constipation, and no doubt, in many instances, it succeeds admirably. He advised doses of from one-sixth to one-fourth of a grain of the extract to be taken once a day, either night or morning, gradually increasing the dose and diminishing or discontinuing the medicine when the constipation is removed. Dr. Nunneley finds this treatment useful in all forms of constipation, especially when co-existing with dyspepsia, characterised by a thinly furred tongue, with prominent red papillæ at the tip, epigastric tenderness, pain after food, and often more or less headache. It ensures a natural evacuation daily. It must be continued a fortnight or three weeks. Mr. Foster of Huntingdon, tells me that a small dose of belladonna prevents the constipating effects of iron. In some of the severest cases of constipation where powerful purgatives had failed, a suppository of one or two grains of the extract has opened the bowels.

Belladonna often relieves colic of the intestines and is especially serviceable in colic of children.

That the active principle of belladonna is readily absorbed into the blood is proved by the symptoms. After a considerable dose of belladonna the face becomes much flushed; the eye bright, dry, and injected; the pupil dilated; the sight dim and hazy; while the power of accommodation in the eye for distance is lost. The mind and senses are peculiarly affected. The ideas, at first rapid and connected, become incoherent and extravagant, and there is often decided delirium with pleasing illusions. Sometimes the patient is seized with restlessness, keeps continually moving, and cannot be quieted. A kind of somnambulism is occasionally observed; cases are recorded where, under the influence of belladonna, the patient for a long time performs the movements customary to his occupation, and it is narrated of a tailor that he sat for hours moving his hands and arms as if sewing and his lips as if talking.

The delirium may be furious and dangerous, requiring restraint; nay, it is recorded of a man poisoned by this drug, that so violent did he become that he was ordered to be confined in a mad-house. Sometimes a very small dose will induce mental disturbance, and so great is the susceptibility of some people that even when applied to the skin in the form of plaster or ointment, belladonna induces marked cerebral disorder.

Belladonna weakens the muscular power, renders the gait unsteady and staggering, so that a patient having lost control over his movements may run against objects he sees yet desires to avoid.

This loss of power is not due to the action on the muscles, but is commonly attributed to the action of atropia on the motor nerves; for it is said atropia paralyses both the terminations and the trunks of motor nerves.

I have made some careful observations on this matter with Mr. Murrell, which lead us to conclude that atropia paralyses much more through its depressing action on the spinal cord, than on the motor nerves. It is well known that considerable difference of opinion prevails on this point, some experimenters attributing the paralysis to the action of the poison on the motor nerves, and others to its action on the cord. Fraser in his article "on the connection between Chemical Constitution and Physiological action," Part ii, says, atropia produces paralysis chiefly by affecting the motor centres and sensory nerves, and our observations confirm this conclusion in respect of the motor centres (spinal cord).

Thus in the experiments we have recorded in this paper, after tying the abdominal aorta, or the femoral artery and vein, and then poisoning the animal, we found that paralysis set in as early, progressed as quickly, and became as complete in the ligatured as in the unligatured and consequently poisoned limb.

It occurred to us that perhaps our experiments were made at a different time of the year to those performed by other observers, and that this might account for the difference in our results. Our first observations were made in May, June and July, but with the view of solving the point we repeated many of them during the month of November. We tied the femoral artery and vein of the right leg of two frogs, and then poisoned them by injecting sulphate of atropia under the skin of the left axilla. To one frog we gave a dose too small to produce complete paralysis; to the other a much larger dose, namely half a grain, which in two minutes caused complete paralysis. In the frog to which the small dose had been administered, both posterior limbs were almost completely paralysed, but the ligatured limb was a little the stronger after the poisoning. In the frog with the large dose, both hind limbs were absolutely paralysed in two minutes. We feel bound, therefore, to conclude that sulphate of atropia paralyses in great part by its action on the spinal cord.

Does atropia exert its action directly on the cord, or only indirectly through its influence on the heart and circulation? Is it a spinal depressant, or are the phenomena we have witnessed simply due to its action as a cardiac poison?

Atropia powerfully depresses the heart of frogs, slowing or even completely arresting its action. Even in cases in which the number of pulsations is reduced by only one half, the heart does very little work; for on examination it is found that during diastole it becomes but slightly distended with blood, so that the circulation must in reality be almost at a standstill. That such is the case is also shown by a microscopic examination of the web of the foot, when the blood is seen to be either stationary, or to be moving very slowly in a few only of the larger vessels.—It occurred to us, this effect on the heart and circulation might cause the paralysis of the spinal cord.

Vulpian found that ligature of the aorta just above the heart, in a few hours suspended the excitability of the cord, and soon after impaired the conductivity of the motor nerves. Paralysis from atropia poisoning, however, comes on very much more quickly than this, a circumstance which at first sight appeared at once to solve the question, and to show that atropia exerts a specific or primary action on the cord. But it occurred to us, however, that it was not improbable that in summer when nutrient changes in frogs are performed much more rapidly than in winter, the functional activity of the cord might be sooner affected by arrest of the circulation. I therefore determined to repeat Vulpian's experiment in a modified form. We tested the condition of reflex action and voluntary movement in eight frogs, in which the circulation had been arrested by mechanical means. In two of these cases the heart was cut or torn out from the chest, and in the remaining six, the aortæ were securely ligatured just above their origin from the bulb. The latter operation was performed as follows:—The animal was pithed by cutting across the medulla, and pushing a spigot of wood through the foramen magnum into the cranial cavity. When the effects of the shock had completely passed off, we pinned the (brainless) animal down on its back, and opened the thorax, by elevating the lower end of the sternum and cutting through the adjacent soft tissues. The heart was then seen to be beating, and the pericardium having been opened no difficulty was experienced in slipping a ligature under the aortæ close to the bulb, and tying them simultaneously. Finally, the sternum was replaced, and the edges of the incision were brought together with a few satures. The operation was usually performed in a very few minutes, and in most cases not a single drop of blood was lost. The experiment of arresting the circulation by removing the heart was even simpler. The brain having been destroyed as before, the thorax was opened by one cut of the scissors and the heart was seized in the forceps, and at once removed. We may mention that the success of the operation was confirmed by a post-mortem examination, although such a step may hardly appear to have been necessary.

As the result of these experiments, I found that, on an average, the impairment of reflex action commenced in 13 minutes, and that the paralysis was complete in 37 minutes. It will be seen that our results differ considerably from those of Vulpian, a discrepancy which we then thought might possibly have been due to the season, and the condition of functional activity of the frogs, although our subsequent experiments have shown that such is not the case. As our experiments on circulation were made at the same time, and under identically the same conditions as our observations on atropia, they are obviously the best fitted for purposes of comparison.

By reference to the table giving the results of poisoning by atropia in frogs, in which the lower limbs had been protected by ligature of the abdominal aorta, it will be seen that in four of these cases loss of reflex action was complete on an average in 38 minutes. These results accord in the most striking manner with those already described as resulting from the mechanical arrest of circulation, and they might be considered to afford a strong proof that the cardiac action of atropia is sufficient to account for the paralysis of the cord produced by this drug. Such, however, is not the case, for on examining the table it will be found that our experiments are in some respects unsatisfactory. The dose of atropia administered was small, so small, in fact, that in two cases the paralysis was never complete. It was therefore obviously necessary to ascertain whether larger doses would not produce complete paralysis in a shorter time. The experiments necessary for the elucidation of this point were made in November, and the opportunity was taken of instituting a series of comparative observations, with the view of determining the effects of mechanical arrest of circulation in producing complete paralysis in brainless frogs. These results are given in the accompanying table.

In these observations, sulphate of atropia, caused on an average, complete paralysis in 4·5 minutes, whilst mechanical arrest of the circulation required, on an average, 34 minutes. In the first of the atropia cases recorded in this table, we tied the femoral vessels before poisoning, and yet the paralysis became complete in both posterior limbs in 2 minutes.

We therefore conclude, that atropia has a direct paralysing action on the cord, and does not affect it through its depressing action on the circulation.

Atropia affects the cord and excites tetanus; an effect long undetected till it was pointed out by Dr. Fraser.

Pithed and Pegged Frogs poisoned with Atropia

Date.	Weight of frog.	Amount in grains of sulphate of atropia.	Proportionate dose.	Paralysis complete.
Nov. 29	20 grammes	$\frac{1}{2}$	$\frac{1}{617}$	2 minutes
"	24 "	$\frac{3}{5}$	$\frac{1}{617}$	4 "
"	30 "	$\frac{3}{10}$	$\frac{1}{1543}$	9 "
"	20 "	$\frac{1}{5}$	$\frac{1}{1543}$	3 "
			Average	4·5 minutes

Table showing the effect of mechanical arrest of circulation in Pithed and Pegged Frogs.

Nov. 29				24 minutes
"				55 "
"				24 "
			Average	34 minutes

Dr. Fraser has shown (1) that in frogs, tetanic symptoms follow the subcutaneous injection of a dose of sulphate of atropia equivalent to about 1000th of the weight of the animal; (2) that this tetanus sometimes sets in on the second day, but more frequently on the third, fourth, or fifth; (3) that it varies in its duration from a few hours to seventeen days; (4) that it is due to the action of the drug on the cord (*medulla oblongata* and *medulla spinalis*).

In conjunction with Mr. Murrell I have made some experiments on the subject which I here introduce. Our observations were made during the months of May, June, and July. The frogs used for the experiments were with a few exceptions the ordinary *Rana temporaria*. We employed, except when the contrary is stated, a 1 in 20 solution of sulphate of atropia in water, the requisite dose being injected either under the skin of the back or into the axilla. The first twelve cases were observed thrice daily, between seven and eight in the morning, one and two in the afternoon, and five and six in the evening. In the subsequent experiments, observations were made much more frequently, with the view of determining how rapidly paralysis occurred, how soon it reached its height, and how quickly it declined. In some cases the animal was under almost continuous observation for many hours, in others the notes were taken every eight or ten minutes for the first hour, and hourly or every three hours subsequently. We may take this opportunity of explaining that whenever we employ the term "pithed and pegged" we mean division of the cord by cutting, and destruction of the brain by the introduction of a piece of wood into the cranial cavity. Like Dr. Fraser, we often obtained strong tetanus from the subcutaneous injection of atropia, but found that his dose (from $\frac{1}{733}$ to $\frac{1}{1330}$ of the weight of the frog) usually killed our animals instead of producing the desired result. With a smaller dose, however, namely, from $\frac{1}{1500}$ to $\frac{1}{3000}$, we were more successful. In our experiments the tetanus commenced earlier than in Dr. Fraser's, our average period of onset being 20 hours; in one case it was well marked in 3 hours, whilst in the longest it was delayed 28 hours. With us, too, it lasted for a shorter time, for in one animal in continued only eight hours and never in any instance exceeded five days. We imagine that these differences are due to the time of the year at which the observations were made.

Why is the tetanus so long delayed after atropia poisoning? One writer, referring to Dr. Fraser's paper, says that the paralysis of the motor nerves prevents the tetanic condition of the cord from displaying itself on the muscles, but Dr. Fraser himself nowhere makes this assertion, and indeed his cases prove the contrary.

This proffered explanation we hold to be erroneous for the following reasons:—

I. Bezold and Bloebaum have shown that even with very large doses it is difficult to destroy completely the conducting power of the motor nerves, and it is obvious that as long as their conductivity is in the smallest degree retained, the tetanic condition of the cord must produce more or less tetanus of the muscles.

II. The onset of tetanus is delayed even in cases in which the dose of atropia is so small as to produce but slight paralysis, and it must be admitted that if the motor nerves are capable of conveying voluntary and normal reflex impressions they can conduct tetanic reflex stimuli. Thus, in many of Fraser's cases there was never complete loss of reflex and voluntary power during the period which elapsed between the injection of the drug and the onset of tetanus. It will be found that of the cases in which he obtained tetanus there were twelve in which the paralysis was incomplete; that in seven of the thirteen in which it had been complete, a partial recovery of reflex and voluntary power had taken place for a day or more before the onset of tetanus. In eleven of our own twenty-six cases there was incomplete paralysis of reflex action and voluntary power, and in all these cases the onset of tetanus was delayed. In two cases, indeed, both voluntary and reflex power had been completely regained before tetanus set in. In one case in which there had been complete paralysis, it began to improve five and a half hours before the commencement of tetanus.

III. If the poison be prevented from having access to certain limited regions by ligature of the nutrient vessels, the onset of tetanus is still delayed even in these protected parts. Fraser gives an account of four experiments, in which he adopted this mode of procedure. In three before poisoning the animal, he tied the femoral vessels, and in one the abdominal aorta, and yet tetanus did not occur in the protected limbs till twenty-two hours, fifty-one hours, three days, and twenty-two hours respectively.

We have tested the action of atropia on ten pithed and pegged frogs, in which, before poisoning, the abdominal aorta had been tied. The following was our mode of procedure:—We first divided the medulla by cutting through the occipitoatlantal membrane, and then passed a pointed wooden peg upwards through the foramen magnum into the skull, so as to destroy the brain, and then tied the abdominal aorta just above its bifurcation. In the three cases in which we obtained tetanus, it was delayed for 25, 9, and 4½ hours respectively.

We conclude then for these reasons, that the late occurrence of tetanus in atropia poisoning is not due to paralysis of the motor nerves, but that it is owing to the cord being slowly affected. It appears that whilst the poison quickly paralyses, it takes many hours or even days before it tetanizes.

It has been suggested that this delayed tetanus, which often sets in from the third to the fifth day, cannot be directly due to the atropia, but must depend on some products slowly formed in the body by the atropia.

This explanation appears to me to be wrong for the following reason. Atropia corresponds to other tetanizers, and conforms to Fraser's law, that when alkaloids producing tetanus are converted with ethyl or methyl compounds, they lose their power of exciting tetanus, and paralyse the ends of the motor nerves. Ethyl-atropium does not tetanize, but is a powerful paralyser of the motor nerves, far more so than atropia itself.

The afferent nerves are unaffected, or but little affected by atropia.

Most observers state that atropia produces severe pain in the head, generally over the forehead, and in the eyes and sometimes the top of the head. Singing in the ears, also occurs, with more or less giddiness. In persons poisoned by this plant, spasmodic contraction of the sphincter of the bladder has been not unfrequently observed, and a scarlet rash often breaks out on the skin—a rash said to be like that of scarlet fever and to be most marked in the neighbourhood of the joints. Mr. J. G. Wilson reports a case in which the local application of belladonna produced a general red rash with redness of the throat and dilated pupils.

The first effect of belladonna on the pulse is to increase its quickness, fulness, and force to the extent even of fifty to sixty beats in the minute, moderate doses at the same time increasing the blood-pressure. This condition of the circulation continues till the tongue and mouth become moist and clammy, when the pulse diminishes in frequency and loses in strength (J. Harley). In fatal cases the pulse grows rapid, intermittent, and weak. Dr. J. Harley considers belladonna a powerful heart tonic, and he points out how the use of it serves to reduce the frequency and to strengthen the beats of the heart when weakened by disease.

Atropia paralyses the terminations of the vagi; for in animals poisoned by atropia neither section, nor galvanization of the vagi affect the heart. When injected into the carotid, so as to reach the central nervous system before the nerves, atropia first reduces the number of the heart's beats, showing that it stimulates the nucleus whilst it paralyses the terminations of the vagi. John Harley, however, denies that belladonna paralyses the vagi nerves, and believes that the quickened heart-beat is due to stimulation of the sympathetic system.

Atropia is considered to paralyse an intra-cardiac inhibitory apparatus. Thus after poisoning by curare, stimulation of the vagi has no effect on the heart, but on the application of the electrodes to the sinus, the heart is at once arrested. Curare it is assumed paralyses the terminations of the vagi, but leaves unaffected an inhibitory apparatus in the heart itself. After poisoning by atropia, neither stimulation of the vagi nor of the sinus affects the heart, whence it is concluded that atropia paralyses the intra-cardiac inhibitory apparatus.

Atropia is considered to stimulate the cardiac accelerator nerve.

Both reasoning and experiments lead Mr. Schäfer, Professor of Physiology at University College, to recommend the use of atropia during the inhalation of chloroform. The chief source of danger during the use of chloroform, is its depressing action on the heart, the heart, in many fatal cases, suddenly ceasing. This action, Mr. Schäfer believes, is due to the chloroform stimulating the inhibitory cardiac apparatus. No doubt, too, some of the cases of sudden death are due to the effect of the operation on the nervous system. Thus, it is well known, that if the leg of a frog is crushed, the heart stops, but division of the vagi prevents this effect on the heart. Now Schäfer argues that, if a dose of atropia be given, sufficient to quicken the pulse, *i.e.*, to paralyse the inhibitory cardiac apparatus, then chloroform no longer will be able to stop the heart nor can it be arrested by shock.

Dr. Nunneley asserts that in the frog, belladonna neither increases the frequency of the heart's beats nor dilates the pupil, and this statement has been abundantly corroborated in respect to its action on the heart showing that belladonna must affect the frog otherwise than man and some other animals, as the dog, the horse, etc.

It is stated by Wharton Jones, Meuriot, J. Harley and others (but denied by Nunneley), that belladonna when applied to the web of the frog's foot contracts the smaller arteries, producing at first acceleration of the circulation, followed after a time by complete stasis, beginning, according to Meuriot, in the veins and capillaries; the circulation always continuing in the artery for some time after it has completely ceased in the vein. According to Harley, a moderate dose contracts the arteries whilst a large dose dilates them; the contraction being due to stimulation, and the dilation to exhaustion of the sympathetic system resulting from its previous over-stimulation.

The action of belladonna on the pupil has been variously explained, some believing that it depends on paralysis of the third nerve supplying the iris; some teaching that it is due to excitation of the sympathetic; and others maintaining that by preventing turgescence of the vessels of the iris, belladonna produces the dilatation. In his able and valuable work, from a survey of the numerous observations of various experimenters, Dr. H. Wood concludes that atropia applied locally causes mydriasis by paralysing the peripheral ends of the oculo-motor nerve and probably by stimulating the peripheral ends of the sympathetic. Given internally, atropia almost certainly causes mydriasis—not by influencing the nerve-centres, but by being carried in the blood to the eye itself and there acting precisely as when applied locally.

It is maintained by Brown-Séquard that both belladonna and ergot of rye exert a powerful influence on the unstriped muscular fibres of the body, and he instances the power of each drug to dilate the pupil and to produce contraction of the uterus. He has seen the vessels of the pia mater of dogs contract after large doses of belladonna or ergot, and he further states that both possess the property of lessening congestion of the cord, while full doses of either medicine diminish its reflex excitability. On the other hand, Meuriot maintains that belladonna intensifies the reflex function. Moreover, Brown-Séquard adds, that one drug acts especially on the involuntary muscles of one part, and the other chiefly on those of another part. He thus concludes that belladonna especially affects the pupil, blood-vessels of the breast (and thus arrests the secretion of milk), muscular fibres of the bowels, sphincter of the bladder (and so obviates nocturnal incontinence of urine [?]); while ergot especially acts on the muscular structure of the womb and blood-vessels of the cord.

These speculations have led Brown-Séquard to use belladonna and ergot in those forms of paralysis depending on chronic inflammation of the cord. By giving ergot internally, and by applying belladonna along the spine in the form of plaster or ointment, he seeks to contract the vessels and to lessen the supply of blood to the cord.

To briefly sum up the probable action of atropia, we find :—

1. It tetanizes the cord and heightens its reflex function.

2. It stimulates the respiratory centre and the inhibitory centre of the heart.

3. It stimulates the cardiac accelerator nerve or its centre.

4. It stimulates the vaso-motor centre and so heightens arterial pressure.

5. It paralyses the motor nerves, first affecting the trunk.

6. It paralyses the termination of the vagi, both in the heart and lungs.

7. It paralyses the terminations of the secretory nerves of the salivary glands and perhaps those of the sweat glands.

8. It paralyses the terminations of the inhibitory fibres of the splanchnics.

9. Large doses slightly depress the functions of the afferent nerves.

10. It paralyses the terminations of the occulo-motor nerves and stimulates the sympathetic so far as the iris itself is concerned.

It appears then, that whilst it acts as a "stimulant" to a large part of the central nervous system, to many of the nerves it operates as a paralyser.

It is right to state, that Dr. John Harley considers that belladonna affects the sympathetic apparatus, first stimulating, then paralysing it, and he explains its effects mainly by a reference to this twofold action.

The influence of belladonna on the sympathetic, led Dr. R. T. Smith to employ it in two cases of exophthalmic goitre—a disease regarded by some as due to paralysis of the sympathetic of the neck. The effects were striking. Five minims of the tincture hourly afforded great relief in four or five days, though the disease had lasted more than a year. In two months the exophthalmos had much lessened. Homœopathic doctors have long employed this treatment.

Belladonna is often used to relieve pain. Dr. Anstie considers it the best remedy to mitigate every kind of pain in the pelvic viscera. Some neuralgias, no doubt, yield to this medicine, and it appears to possess most efficacy over neuralgia referable to the fifth nerve. Cases are recorded of relief afforded by it in sciatica.

Trousseau recommended the following method of treating neuralgia:—To administer one-fifth part of a grain every hour till giddiness is produced, and then to lessen the dose; but to continue the medicine for several days.

Trousseau also employed belladonna successfully in epilepsy, according to the following method:—"During the first month of treatment, the patient takes a pill, composed of extract of belladonna and powdered leaves of belladonna, of each one-fifth part of a grain every day, if his attacks occur chiefly in the daytime; or in the evening if they are chiefly nocturnal. One pill is added to the dose every month; and whatever be the dose, it is always taken at the same period of the day. By this means the patient may reach the dose of from five to twenty pills, and even more." The dose is to be regulated by circumstances. This treatment it is said, even when it fails to cure, yields much relief.

Belladonna often allays both the cough and oppressed breathing of asthma. To ensure success it must be employed in considerable doses, as Dr. H. Salter has lately pointed out, and I have often verified his observations. Ten minims of the tincture every two or three hours, a quantity generally well borne, is often sufficient; but if any of the undesired symptoms of belladonna set in, the dose must be reduced. If the patient is not very susceptible to the action of the drug, far larger doses are sometimes required. Thus, occasionally, half a drachm of the tincture hourly is well and advantageously borne. Such a dose need only be taken at the time of the paroxysm; but when this lasts several days, the medicine should be given in the quantity recommended till an impression is made on the disease. The effect is chiefly satisfactory in either averting the attack or rendering it milder.

Belladonna is one of the best remedies for whooping cough; but, as in asthma, to obtain any good from it, it must be employed in considerable doses. To children two and three years old I often give as much as ten minims of the tincture every hour, and this quantity usually produces no effect, except on the cough, neither dilating the pupil, nor, so far as one can judge in children so young, making the throat dry; and it certainly does not in children a little older, who are able to express their feelings.

Should drowsiness, delirium, or dilatation of the pupil occur, of course the dose must be diminished. The only symptom I have witnessed from these large doses is dilatation of the pupil.

Children, it is well known, bear belladonna much better than adults; hence the slight effect of so large a dose, and the small influence which a less quantity exerts on whooping-cough —a disease of childhood. Some writers state that children become rapidly accustomed to belladonna. These large doses, however, may be given at first, and in the course of many cases, I have never had to give less on account of any toxic effects. These doses often much reduce the severity and frequency of the cough, even during the period when it is most violent and convulsive. But, like all other remedies in this disease, belladonna is of little use if the child is exposed to cold and cutting winds. If the weather is cold the child should be confined to the house in a warm room; if the weather is mild, out-door exercise, is of course, highly beneficial; but cold must be most carefully avoided.

While there can be no reasonable doubt of the great efficacy of belladonna in many cases of whooping-cough, it must be admitted that in many instances, without apparent reason, it fails. Influences, at present not understood, appear to modify its effect; for in some epidemics it is very successful, while in others it appears to be inoperative. Belladonna exerts but little effect on whooping-cough, when bronchitis or any irritation exists, as that from teething, worms, etc. If the gums are red, swollen, and painful, they must be freely lanced, and other sources of irritation removed. Belladonna is considered of especial use in the third week of the attack,—at a time, that is, when the febrile stage has passed away, and the violence of the convulsive attacks is declining.

Belladonna is often useful in other coughs, although with our limited knowledge on this subject it is impossible to lay down precise rules for its employment.

It is often useful in certain forms of headache,—for instance when the pain is situated over the brows and in the eyeballs, which seem as if too large for the head and as if they would be forced out of the skull. These headaches are not due to stomach or uterine derangements; indeed, very often their cause cannot be discovered. They are especially peculiar to young women and they seem due to weakness and overwork. Three minims of the tincture should be given every three hours.

It is said that belladonna controls the delirium of fevers—as of typhus fever.

Dr. John Harley finds belladonna useful in typhus fever. It slows and strengthens the pulse,—reduces temperature, moistens the tongue, and he thinks shortens the course of the disease. Its prolonged use makes the heart irritable.

Belladonna is both speedier and more certain than any other remedy in removing that troublesome affection, incontinence of urine. It must be given in doses of from ten, twenty, to thirty drops of the tincture three times a day; small doses often fail, when large ones at once succeed. It may take a fortnight to succeed. Sometimes the incontinence is not limited to the night, but may trouble children during the day. These severe forms will often yield to belladonna; but while in some cases it is thus effectual, still it often fails altogether, although no worms infest the intestines, no irritation exists about the rectum, and no reason seems to exist to account for its failure. Strychnia, cantharides, turpentine, santonine, or galvanism, should then be tried.*

It sometimes checks the incontinence of urine of the old or paralytic.

Belladonna, used internally or externally, is certainly efficacious in erysipelatous inflammation. It may be given in combination with aconite; but when the skin is hot and pungent, and the pulse is firm and resistant, aconite exerts over this inflammation an influence far more potent than that of belladonna.

Belladonna has been recommended as a preventive of scarlet fever, but so much prejudice has been introduced into the discussion of this question, that it is difficult to conclude whether it has any prophylactic virtue.

Belladonna has been found of service in the treatment of seminal emissions; a grain and a half of sulphate of zinc with a quarter of a grain of extract of belladonna, three or four times a day, is often a successful remedy in cases of nocturnal emissions.

Atropia is antagonistic to opium, calabar bean, muscarin, jaborandi, bromal, aconite, and prussic acid.

As belladonna and opium are in some respects reciprocally opposed in their action, as on the eye, etc., it has been assumed that they must be opposed in every particular, and that one is as an antidote to the other. Many cases are adduced of opium poisoning, where the symptoms although very serious, were apparently removed by belladonna, and *vice versa*. Dr. Erlenmeyer is of opinion, that, in respect to their action on the brain, these agents are antagonistic, and that no coma will result when they are administered conjointly; but that they exercise no mutual counteractive influence on the sensory nerves, and hence he recommends them in combination to relieve pain. On the other hand, some authorities, among whom may be named Brown-Séquard and J. Harley, dispute this antagonism, on the ground that the cited cases are insufficient to prove it; and it has not been observed in experiments on the lower animals and on man. It must be remembered, however, that these drugs do not similarly affect animals and man. The reported cases in favour of this antagonism have been severally criticised by Harley, who points out that many were treated by other remedies besides belladonna; in others, a fatal dose is not proved to have been taken; and the patients who recovered, did not improve sooner than if no belladonna had been administered. Harley concludes, and in most respects he is directly opposed to Erlenmeyer,—" 1. That in medicinal doses the essential effect of morphia (hypnosis) is both increased and prolonged by the action of atropia, whether introduced previously or at any time during the operation of the former. 2. That atropia relieves, and if given simultaneously or previously, prevents the nausea, vomiting, syncope and insomnia, which frequently result from the action of opium. 3. That in a sufficient proportion (for most individuals one forty-eighth part of a grain of sulph. atropia to a quarter of a grain of acetate of morphia) atropia neutralizes the contractile effect of opium on the pupils; but in larger doses dilatation takes place as if no morphia had been given. It is also to be observed that if the quantivalent doses are *successively* introduced, the drug last administered exhibits for a short time a counteracting effect. 4. That all the other effects of atropia are intensified and prolonged by the action of morphia, induced previously or at any time during the operation of the former. If, however, the dose of atropia be small, and the morphia produce considerable deranging effects on the vagus, the rapidity of the pulse is not greater than when the atropia is administered alone." Had Harley given opium in a dose just sufficient to destroy life, and had death ensued after the employment of belladonna, he would have proved that belladonna would not arrest the fatal effect of opium, and *vice versa.* In no reported instance did he use enough of either substance to destroy life; hence his observations are not so convincing as they might have been; but as the coma from opium was intensified by belladonna, his observations are valuable.

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* In nocturnal incontinence the child should drink but little some hours before going to bed, and he should be waked in the middle of the night to pass water.

On the other hand, Dr. Johnson of Shanghai, who during his residence in China, had striking experience of opium poisoning, having treated in various ways upwards of 300 cases, speaks in the strongest terms of the antagonism between opium and belladonna. It is, he says, in the worst cases of poisoning, that atropia displays its wonderful effects; for instance, where the immoveable pupils are contracted to a pin's point, the conjunctiva insensible to touch, the face pale, the lips, eyelids, and nails livid, the pulse weak and irregular, the breathing slow and stertorous, the extremities cold, if half a grain of atropia be injected, in ten or twenty minutes the pupils begin slowly to dilate, and in an hour or so the face becomes flushed, the breathing soft without stertor, and the pulse stronger. If within two hours the dose fails to produce these restoring effects, Dr. Johnson repeats the injection. Where the coma is less profound he first employs a quarter of a grain of atropia.

The recent Edinburgh Committee, presided over by Dr. Hughes Bennett conclude:

1. That sulphate of atropia is within a limited range physiologically antagonistic to meconate of morphia.

2. Meconate of morphia does not act antidotally after a large dose of atropia; thus whilst atropia is an antidote to morphia, morphia is not an antidote to atropia.

3. Meconate of morphia does not antagonize the effect of atropia on the branches of the vagi applying to the heart.

While there is doubt concerning the antagonism between opium and belladonna, the interesting experiments of Fraser have demonstrated beyond question that atropia is an antidote to physostigma; and as the action of these substances on man and animals is identical, he concludes that atropia will neutralize the fatal effects of physostigma on human beings. His experiments were conducted in three ways: (1) He administered the atropia before the physostigma; (2) He administered them together; (3) He administered the physostigma, and, after the animal was completely paralysed, he injected atropia. In each series of experments atropia averted the fatal effects of physostigma, although physostigma was employed in fatal quantities, as was afterwards proved by administering to the animal the identical or even a smaller dose by itself, when in every instance the animal speedily died. Fraser concludes that "the lethal effects of doses of physostigma greatly in excess of the minimum fatal, may be prevented by doses of atropia greatly below the minimum fatal." He recommends, "in treating cases of poisoning in man, the sulphate of atropia should be given by subcutaneous injection, in doses of from one-fiftieth to one-thirtieth part of a grain. The exhibition of the antidote should be persevered with, in repeated doses, until the pupils are fully dilated and the pulse rate increased, and probably also until the hypersecretion of bronchial mucus, which greatly impedes respiration, is completely checked."

He thus summarises the antagonism between these two substances: "That physostigma increases the excitability of the vagi nerves, while atropia diminishes and suspends this excitability; that physostigma diminishes the arterial blood-pressure, while atropia increases it; that physostigma greatly augments the secretion of the salivary, bronchial, intestinal, and lachrymal glands, while atropia diminishes and even conpletely checks these secretions; and that physostigma contracts the pupils, while atropia, to a much greater relative extent, dilates them. Besides these effects of the action through the blood, various opposed topical effects have been observed, among which is the contraction of the veins by physostigma—the existence of which rests on the high authority of Mr. Wharton Jones—and the contraction of the arteries by atropia."

Dr. Fraser has recently published some further experiments on the antagonism between physostigma and atropia, being led to this investigation by reflecting that while no doubt the more active and poisonous effects of physostigma are antidoted by atropia, still it seemed possible that physostigma might possess some properties—might affect some part of the body in a manner not opposed by atropia—and that both poisons might possibly possess certain properties in common, so that while some of the poisonous properties of each substance were antagonistic, other poisonous properties might not be so opposed, nay, might be similar in kind and assist each other. His experiments confirm these conjectures. He found that after a minimum fatal of physostigma, death could be averted by a dose of atr varying greatly in quantity; but as he increased the dos physostigma so the range of antidotal doses of atropia bec diminished, and so far from requiring a larger maximum dotal dose, the greater the quantity of physostigma administ the smaller became the maximum antidotal dose of atropia at last a point was reached when atropia ceased to avert d For instance, with a minimum fatal dose of physostigma, a of atropia varying from nine-thousandth to five grains preve the rabbit's death; but on increasing the dose of physost to one and a half times the minimum fatal dose, the anti dose of atropia ranged from one-fiftieth of a grain to four gr and on augmenting the dose of physostigma to two and a times the minimum fatal dose, the antidotal dose of at ranged from one-fortieth to two grains and a half. With and a half times the minimum fatal dose of physostigma range of atropia sufficient to avert death was reduced from tenth of a grain to one-fifth of a grain, and with four time minimum fatal dose of physostigma, atropia failed to death. Here, while atropia prevented the more powerfully effects of physostigma, yet on increasing the dose of this dr point at last is reached when its properties not antagoniz atropia, become fatal. But the fatal issue is not solely d increasing the non-antagonized properties of physostigma the range of an antidotal dose of atropia became lessene proportion as the dose of physostigma was increased, sho that the atropia assisted the physostigma. The fact is shown by the experiment of injecting simultaneously one the minimum fatal dose of each substance with the resu killing the animal.

The foregoing experiments, moreover, make it apparent atropia is an antidote for only a given quantity of physosti and that, if the physostigma is increased, a quantity at l reached the more active properties of which no doubt are tralized by atropia, but the other properties in conjunction similar ones of atropia are sufficient to cause death.

It is a most singular fact that while the minimum fatal do extract of physostigma is 1·2, and that of atropia 2·2 grains nine-thousandth of a grain of atropia injected five mi before giving a minimum fatal dose of physostigma prevent fatal effects; in fact a quantity of atropia which produces no perceptible effects will avert many of the serious effects of a fatal dose of physostigma.

Although it is experimentally proved that atropia can avert death from physostigma, the question yet remains unsettled whether physostigma can prevent death from atropia.

Dr. Fraser conceives that "with regard to the counteracting actions themselves it is to be observed that various of the facts mentioned in the record of experiments [of his paper] tend to make mutual antagonism, probably not only of one, but of several of the actions of physostigma and atropia; and it is legitimate to suppose that with a given dose of physostigma, the counter-action produced by a certain amount of atropia will be more perfect in the case of one or more of the antagonistic actions, than in that of others; and that with certain doses of the two substances such incompleteness of counteraction may exist as would even without the occurrence of *non*-antagonized action suffice for the production of death."

The Edinburgh committee confirm Fraser's statements, but find that the range of antagonisms is even more restricted than the limit fixed by this investigator.

Dr. Brunton has drawn attention to the antagonism between atropia and the poisonous principle of fungi—muscarin. Dr. Schmiedeberg had previously pointed out an antagonism in respect to their action on the heart; thus whilst topically applied atropia will arrest the heart of a frog, a mere trace of muscarin applied to this organ will sometimes restore the pulsations even after the heart has ceased beating for four hours.

The poisons have likewise an antagonistic action on the pulmonary blood-vessels. Muscarin produces intense dyspnœa and emptiness of the arterial system, so that cut arteries scarcely bleed at all, effects which Brunton has proved to depend on spasm of the pulmonary vessels. He narcotized an animal with chloral, and after the lungs were exposed, kept it alive by means of artificial respiration, in which state a dose of muscarin caused blanching of the lungs, distension of the right side of the heart and vena cava, and shrinking of the left ventricle. A little atropia now injected into the jugular vein at once removed these phenomena; the lungs became rosy, the distension of the right side of the heart subsided and the left ventricle regained its natural size. Atropia removed the dyspnœa as well as the other symptoms produced by muscarin.

Muscarin moreover stimulates the terminations of the chorda tympani nerve, and increases salivary secretion, exhibiting in this respect also an antagonism to atropia. Muscarin also excites copious perspiration (see Muscarin).

There is a well-marked and interesting antagonism between atropia and jaborandi. Jaborandi excites profuse perspiration and salivation, and when applied to the eye it contracts the pupil, and as Mr. John Tweedy has shown, causes tension of the accommodative apparatus; in these respects being obviously the antagonist of atropia. Jaborandi also produces a dull pain over the eyes, sometimes associated with giddiness; likewise over the pubes with an urgent desire to pass water, in these results as regards symptoms corresponding to the action of atropia; yet even in this respect these drugs are unopposed; for the injection of $\frac{1}{100}$ gr. of atropia not only speedily checks the sweating and salivation produced by jaborandi but checking also the headache and pain over the pubes with desire to pass water. Mr. Langley has pointed out that these drugs are antagonistic as regards their action on the heart; thus jaborandi at first slows and then arrests the heart in diastole, whilst atropia restores the heart's action even after its arrest for a considerable time. Atropia, as we have seen, paralyses the terminations of the pneumogastric nerves, and Langley shows that jaborandi at first stimulates and then paralyses these nerves. Its antagonistic effects on the heart are not due to its influence on the pneumogastric, for it slows and stops the heart after the complete paralyzation of the pneumogastrics by curare. The effect of jaborandi on the human heart appears to be different, for in a large number of observations I found that jaborandi always considerably quickened this organ. In two respects these drugs agree, thus each flushes the face and both affect children much less than adults (see Jaborandi).

Atropia is antagonistic to bromal. Bromal ordinarily destroys life by increasing the bronchial and salivary secretion, to so great an extent that the animal is choked by it. Now atropia checks these secretions and thus prevents the lethal effect of bromal. But, on the other hand, it need hardly be said that bromal will not prevent the fatal effect of atropia, for this drug does not destroy life by its influence on the bronchial mucous membrane or salivary glands.

Dr. John Harley points out an interesting antagonism between aconitia and belladonna. He poisoned a dog with aconitia and reduced the pulse to 65 and 75 per minute, and then gave gr. $\frac{1}{96}$ of atropia with the speedy effect of both quickening and strengthening the heart, and in three quarters of an hour the heart beat 300 per minute, being 230 beats faster than before the administration of atropia. Harley adduces this experiment to show that atropia affects the heart by its stimulating action on the sympathetic, and thus atropia both strengthened and quickened the heart's beats; but whilst atropia by paralysing the vagi might quicken the heart it could not increase its strength, this being probably due to the action of the atropia on the excito-motory cardiac apparatus.

Preyer maintains that atropia, by paralysing the peripheral branches of the vagus nerve, will prevent the arrest of the heart's contractions by hydrocyanic acid and is thus an antidote to it.

That atropia is separated from the body in part by the urine may be proved by putting into the eye some of this secretion voided by one to whom belladonna has been given. J. Harley states that atropia is eliminated from the body within two hours, none after that time being found in the urine.

Dr. Garrod has shown that caustic fixed alkalies destroy the active principle of belladonna, hyoscyamus, and stramonium, but that carbonates and bicarbonates of potash and soda do not destroy it. Lime-water, too, is equally destructive; hence it has been recommended as an antidote in poisoning by belladonna. (J. Harley).

ETHYL-ATROPIUM. METHYL-ATROPIUM.

The action of these substances in which an atom of ethyl or methyl is substituted for a molecule of H. in atropia has been studied by Fraser with his accustomed thoroughness and ability. In conjunction with Mr. Murrell I have studied the action of ethyl-atropium. Fraser experimented with iodide of methyl-atropium, sulphate of methyl-atropium and iodide of ethyl-atropium. We experimented with uncombined crystalline ethyl-atropium, prepared for us by Mr. Wright, under the direction of Dr. Graham, Assistant Professor of Chemistry at University College.

From experiments on frogs, Fraser concludes that these substances paralyse the terminations of the motor nerves leaving unaffected the sensory nerves and spinal cord. Our experiments led us to conclude that ethyl-atropium paralyses the motor nerves and the spinal cord, but leaves the sensory nerves unaffected.

Both Fraser and we find that these compounds do not tetanize.

Fraser ascertained that whilst atropia produces in dogs both paralysis and convulsions, ethyl-atropium induces only paralysis.

His experiments on rabbits show that these substances powerfully paralyse the cardiac inhibitory fibres of the vagi.

In fatal doses, Fraser finds that ethyl-atropium slightly dilates the pupil. We have given it to men in doses sufficient to produce decided symptoms but without causing any dilatation of the pupil. We all find that its topical application to the eye widely dilates the pupil; but our experiments on man show that in twelve or twenty-four hours the dilatation nearly or quite passes off.

In our experiments on man this drug, given in doses sufficient to produce marked symptoms, neither strengthened nor quickened the heart; hence we may infer that in the doses we gave, it does not in man paralyse the vagi.

In man, a dose of one grain given hypodermically, produces decided but transient paralysis, the patient being unable to stand or walk, and the head dropping rather towards the shoulder or chest, and the upper eyelids drooping. Fraser finds that in fatal doses it produces complete paralysis in dogs and rabbits.

In man, ethyl-atropia excites pain over the eyes, but unlike atropia it does not excite delirium nor produce coma, nor does it check the salivary or the cutaneous secretion.

Fraser finds that these compounds act more powerfully on frogs and rabbits and dogs than atropia. Our observations confirm his statement as regards frogs, but we find that the action of ethyl-atropium on man is far feebler than that of atropia. Thus a grain given hypodermically excites merely slight but distinct symptoms, whilst a grain of atropia produces great weakness and sleep, lasting some hours, with delirium.

It seems, therefore, that atropia conforms to Fraser's law, namely, that a tetanizing alkaloid, when converted into an ethyl or methyl compound, loses its tetanizing action and produces paralysis of the motor nerves. But in the conversion of atropia into ethyl-atropium and methyl-atropium, many of the other effects of atropia are lost; thus like atropia these compounds dilate the pupil, paralyses the terminations of the cardiac inhibitory vagus fibres, and paralyses in a far greater degree the motor nerves, whilst it loses the atropia properties of tetanizing, or diminishing the salivary and cutaneous secretion, of affecting the brain, and, according to Fraser, of paralysing the cord.

In respect to the effect of these compounds on the cord we suggest that there may have been some slight difference in the preparation used by Fraser, and that prepared for us. Our observations were very carefully performed, and we believe they may be relied upon, and we feel equally sure that Fraser's are likewise trustworthy; and we can only reconcile the discrepancy between us by the foregoing assumption.

HYOSCYAMUS.

In many, if not in all respects, the effects of this drug correspond to those of belladonna and stramonium. Thus it flushes the face, dries the mouth and throat, dilates the pupil; produces a subdued form of delirium and hallucination, and in large doses comatose sleep. It greatly quickens and strengthens the heart's contraction, and sometimes produces a red rash which, like that of belladonna, may be patchy. It increases the quantity of urine. In some observations made by Mr. Pearse and myself, it failed to produce increased action of the kidneys (Lawson); poisonous doses produce a drunken gait from loss of voluntary power, the drug probably acting on the nervous system like belladonna. In some valuable papers, Dr. Robert Lawson has recommended hyoscyamia in various forms of mania, with the view of producing sleep, and substituting a mild, for a more active and obstinate delirium. He gives a grain, to a grain and a half which, in fifteen minutes generally induces sleep, lasting ten to twelve hours, when the patient wakes free from delusions. Smaller doses produced only delirium due to the drug without sleep. Hyoscyamia is especially useful in the more violent forms of intermittent mania, when it is difficult to restrain the patient. It quiets a patient at once through its action on the nervous system. I have tried this drug in a few cases, and my observations in common with other observers, entirely corroborate the statements of Dr. Lawson.

I have tried it in four cases of delirium tremens, but without any very satisfactory results. Small doses failed to produce sleep, but simply quieted the violent patient, and substituted the muttering delirium of hyoscyamia for the uncontrolable delirium of the disease. Larger doses produced many hours' sleep, but on waking, the delirium and general condition were unamended. In one case, we gave the alkaloid several nights successively, but without any benefit; then a dose of chloral made the patient sleep all night and with much improvement next day. It will probably be useful in cases where the patient is very violent, and irrestrainable, with delirium like that of acute intermittent delirium.

Hyoscyamus is generally used to produce sleep when opium disagrees. It has also been employed in neuralgia.

Like atropia, hyoscyamia, as Dr. Garrod proves, is destroyed by the fixed caustic alkalies.

The effects of hyoscyamia are so similar to those of atropia and daturia, that I determined to compare the operation of these three alkaloids in a case of acute mania, and found that they produced almost identical effects.

The following observations were made by Mr. J. S. Bury and myself:—

E. R., aged twenty-two, a nurse at University College Hospital, seemed one night when on duty to be odd in her manner; next day she was unmistakably mad. She lay in bed with her eyes closed, disregardful of everything around her. She talked incoherently, and when asked a question made allusion to a different subject. Her temperature was 99, pulse, 104, her breathing irregular. Her bowels were constipated. Beyond her madness we could not discover any disease. Her manner soon changed, for next day she sat up in bed, looking vacantly around her, and continued in this state day and night, getting no sleep in spite of narcotics. Her delusion took a religious form, and she showed a suicidal tendency. She very rapidly lost flesh, her eyes became sunken, notwithstanding she took a fair amount of milk and beef-tea. Her tongue was always dry, and her temperature normal. She passed everything involuntary. Unless we could give her sleep we felt that she must soon die, and, morphia having failed, we determined to use hyoscyamia. On the evening of October 25th we gave her a grain of the crystallised alkaloid with complete success. We then resolved to give atropia, and ascertain if that would answer as well. Afraid to give a grain of atropia, we, on the first night, gave only a quarter of a grain, but without producing sleep. We next gave three-quarters of a grain, and then a grain, and afterwards we employed daturine and ethyl-atropium. The effects of these different remedies are given subsequently in a table. With sleep, the bodily health of the patient greatly improved, but her mind continued in the same feeble state.

The first dose of hyoscyamia flushed her face and hands a deep red, but this effect was not afterwards noticed. Before the use of hyoscyamia, her tongue, as we have said, was always dry, and the day after the first dose it was drier than usual; but subsequently, to our astonishment, the tongue was always moist in the day time, though it became very dry for some hours after each dose of the alkaloid. We were astonished also to find that after the second or third day the skin was always moist during the day; during the early part of this treatment her tongue was very red, though moist and clean, but afterwards it became quite natural. About a week before she left hospital to go home she was allowed to get up, and she constantly walked slowly about the ward, kneeling down before the other patients. We were unable to take the pulse very frequently, or otherwise very closely study the effects of this large dose of hyoscyamia as we were afraid lest we should wake her, and we felt that her life depended on her getting sound refreshing sleep. After the first dose of hyoscyamia, the pulse rose from 104 to 144 in half an hour; in an hour it had fallen to 120, and then gradually declined, till after eight or nine hours it again beat 100. The respirations were not hurried. After the second doses the pulse rose from 104 to 125. On the following nights the pulse was very little affected. On the twelfth day of her illness her pulse fell to 80. We may add that throughout her pupils were widely dilated. We now give a table showing the effect of the various alkaloids in producing sleep.

Date.	Medicine.	Time given.	Interval before sleep.	Duration of sleep.
1876				
Oct. 21	Liq. Morph. ♏xx.	Bedtime	—	None
„ 22	Same	„	—	None
„ 23	Same	„	—	None
„ 24	Liq. Morph. ♏100 (in three doses)	„	—	None
„ 25	Hyoscyamia, gr. 1 (?)	4 P.M.	1 hr.	15½ hrs.
„ 26	Hyoscyamia, gr. 1	7 „	1¼ hrs.	11½ hrs.
„ 27	Same	7.45 „	1¼ hrs.	9½ hrs.
„ 28	Same	8.15 „	1¼ hrs.	8 hrs.
„ 29	Sulphate of atropia, gr. ¼	5 „	—	No sleep
„ 30	Hyoscyamia, gr. 1	11.45 A.M.	1½ hrs.	11¼ hrs.
„ 31	Sulphate of atropia, gr. ¾	9.7 P.M.	1 hr. 3 m.	7¼ hrs.
Nov. 1	Sulphate of atropia, gr. 1	8 „	2 hrs.	7½ hrs.
„ 2	Hyoscyamia, gr. 1	8.15 „	1¼ hrs.	9½ hrs.
„ 3	Daturine, gr. 1	8.15 „	1 hr.	8 hrs.
„ 4	Ethyl-atropium, gr. 1	8.30 „	—	No sleep
„ 5	Hyoscyamia, gr. 1	10.15 A.M.	1 hr. 5 m.	13½ hrs.
„ 6	Same	8 P.M.	1½ hrs.	9½ hrs.
„ 7	Daturine, gr. 1	8 „	2½ hrs.	7 hrs.
„ 8	Sulphate of atropia, gr. 1	8.15 „	2 hrs.	7 hrs.
„ 9	Hyoscyamia, gr. 1	8.30 „	2 hrs.	8 hrs.
„ 10	Daturine, gr. 1	8.30 „	2 hrs.	6 hrs.
„ 11	Sulphate of atropia, gr. 1	8.30 „	1¾ hrs.	6¼ hrs.
„ 12	Hyoscyamia, gr. 1	8 „	¾ hr.	7¼ hrs.
„ 13	Daturine, gr. 1	8.30 „	1 hr.	7 hrs.
„ 14	Sulphate of atropia, gr. 1	8.30 „	1 hr.	7 hrs.
„ 15	Ethyl-atropium, gr. 1	—	No sleep	—
„ 16	Sulphate of atropia, gr. 1	8.30 P.M.	1½ hrs.	8 hrs.

Hence, excluding the first two nights with hyoscyamia, during which time the patient appeared to grow somewhat accustomed to the drug, and thus it seemed to lose some of its effect, we find that hyoscyamia on an average produced 9½, sulphate of atropia 7¼, and daturine 7¼ hours' sleep.

It thus appears that in cases of madness or delirium, sulphate of atropia and daturine are as efficacious, or nearly so, as the far more expensive alkaloid hyoscyamia. Perhaps it may be objected that the sleep she latterly obtained was natural sleep, not at all due to the alkaloids, but the preceding table shows that on the night she took a too small dose of sulphate of atropia and on the night she took ethyl-atropium, she had not even five minutes' sleep; the nights were absolutely sleepless. The sleep was very heavy, but the patient could be waked, but immediately relapsed into sleep. Sometimes the breathing was a little stertorous. She slept with her mouth wide open. We deferred publishing this case for some weeks, that we might ascertain how the patient progressed after leaving the hospital, as we felt that possibly the alkaloids might have caused some of her delirium, though this was improbable, for the delirium of belladonna usually subsides in less than twenty-four hours, and yet in this case, when she took ethyl-atropia (a drug which does not affect the brain) and got no sleep, the delirium was always worse the day following the sleepless night.

About a week after reaching home she began to improve, and the report in a letter, dated December 7, says "for the last ten or eleven days she has been quite sensible. She is quite cheerful, but her eyes are too weak to read much at present." The effect of the alkaloids on her eyes had not, it seems, quite disappeared twenty-one days after the last dose of alkaloid.

STRAMONIUM.

Stramonium produces symptoms very similar to those induced by belladonna. A stramonium ointment, used at the Middlesex Hospital, is made by mixing half a pound of fresh stramonium leaves with two pounds of lard, and gently heating till the leaves become friable, then straining through lint. This ointment spread on lint and applied thrice daily relieves pain. Stramonium, smoked with or without tobacco, is mainly used to reduce spasm in asthma. It is especially valuable in pure asthma, that is, when the lungs are structurally free from disease, and is useless when the dyspnœa is due to heart disease. Twenty grains of the dried leaves, or ten of the powdered dry root, may be smoked, inhaling meanwhile into the lungs; or an inverted tumbler into which fumes have been puffed until it is filled, may be placed over the mouth, and the contents inhaled by a deep inspiration. It excites a good deal of cough. The inhalation may be repeated again and again. It is better to smoke the plant unmixed, as few can draw the fumes of tobacco into the lungs without great discomfort. There is no doubt that in many cases of asthma stramonium is very successful; but in others, without apparent reason, it fails, and even when it succeeds, its influence gradually diminishes by use. Sometimes datura tatula succeeds when datura stramonium has failed. Dr. Salter believed that stramonium often failed owing to the badness of the preparation, and he advised asthmatics to grow and prepare their own stramonium. Its effect is more manifest when employed at the very commencement of an attack, affording but little relief when the paroxysm is fully developed. Cold stramonium smoke can sometimes be inhaled when the hot is intolerable. It has been used in neuralgia.

Like belladonna and hyoscyamus, its active principle, as Dr. Garrod has shown, is destroyed by caustic potash and caustic soda.

HYDROCYANIC ACID. CYANIDE OF POTASSIUM.

These poisonous substances are destructive alike of animal and vegetable life.

When applied to the skin for a long time, solutions of these substances, particularly the cyanide, excite some inflammation on account of their alkalinity.

Kept in contact with the skin for awhile, they diminish sensibility. Formerly they were employed externally in painful diseases such as neuralgia and rheumatism; now, however, they are quite superseded by more successful remedies. But in allaying the tormenting itching of urticaria, lichen, eczema and prurigo, they are undoubtedly very serviceable. The itching skin should be bathed with a lotion made of a drachm of the cyanide of potassium to a pint of water, or thirty drops of hydrocyanic acid to the ounce of water or glycerine. In respect to the cyanide, the action of the prussic acid is assisted by the potash in combination with it. It need hardly be observed that such a lotion must not be applied to broken skin, for fear of poisoning by absorption.

Dr. Gee employs sulpho-cyanide of potassium in tinea tonsurans. He recommends the hair to be kept close cut, and that the scalp should be washed twice a day with warm water and soap, and after drying the head, the patches should be well rubbed with a lotion composed of half an ounce of sulpho-cyanide of potassium, 1 ounce of glycerine, and 7 ounces of water. The scalp should be covered night and day with lint soaked in this lotion, superimposing a piece of oiled silk; a stronger solution is apt to excite eczema.

The acid possesses a bitter characteristic taste, and excites a sensation of itching in the mouth. It stimulates the flow of saliva, possibly by its action on the mucous membrane of the mouth.

Taken in moderate doses, in a healthy stomach the acid appears neither to produce nor to undergo change; it is nevertheless much used, frequently with benefit, in painful diseases of this organ, as in chronic ulcer, cancer, chronic gastritis, gastralgia, &c.. Not only does it occasionally mitigate the pain of these affections but it may also check vomiting.

Hydrocyanic acid passes very speedily into to the blood, and is as speedily eliminated, probably with the breath; hence, if life can be supported for half an hour after a poisonous dose the patient is generally safe.

How it destroys life is still a disputed question. Being fatal equally to plants and animals, it is not necessary that it should act on the nervous centres, as from the rapidity of its action, has been supposed. From his experiments on frogs, Kölliker concludes that it paralyses first the brain, next the cord, and then the motor nerves, the paralysis extending from the trunk to the periphery. It paralyses the heart, its action ceasing in the diastole. The voluntary muscles soon loose their irritability, and become stiff.

Preyer maintains that large doses of hydrocyanic acid paralyse the heart at once; that moderately fatal doses deprive the blood of oxygen; and that as belladonna paralyses the peripheral branches of the vagus, and at the same time stimulates the nervous centres of respiration, atropia in these cases hypodermically injected will prevent death.

OPIUM AND ITS PREPARATIONS.

Small doses of opium excite tetanus in frogs; but birds, such as ducks, chickens, and pigeons, cannot be poisoned by crude opium, by aqueous extract, nor by black drop (acetum opii), given internally; and morphia salts must be given in enormous doses. Morphia employed hypodermically in very large doses never causes sleep nor stupor, but convulsions. Thebaia is a tetanising agent inferior only to strychnia and brucia. Narcotina, almost without effect on man, destroys birds in doses of two to seven grains when used hypodermically. Codia is a fatal convulsive agent to pigeons. Meconia given internally causes emesis, but is harmless when injected under the skin. Narceia has no perceptible influence except to disturb the respiration slightly. Cryptopia in doses of one-fifth to one-half a grain has no effect. None of these agents cause sleep in pigeons, ducks, or chickens. (Dr. Weir Mitchell.)

Dogs, cats, and rabbits, require larger doses of opium to produce stupor or sleep which is generally accompanied by convulsions. In the lower animals, like frogs, opium only excites tetanus; but as we ascend in the animal kingdom the soporific effects become apparent and are most marked in man. Race modifies the effects of opium, for it drives the Javanese and Malays into a temporary madness; and even among Europeans its effects vary considerably in different individuals. In some persons, especially women, it produces much excitement but no sleep, the excitement being sometimes pleasant, at other times extremely disagreeable. In some instances if it fails to induce sleep it soothes, and pleasant ideas occupy the mind; with other persons it induces restlessness, excitement, and even delirium.

Preparations of opium, applied by means of poultices or friction, are absorbed by the unbroken skin.

Poultices containing laudanum are used to allay the pain of superficial and even of deep-seated inflammations, and enough may be absorbed in this way to produce deep sleep. Friction considerably increases the absorption; thus liniment of opium, well rubbed in, relieves neuralgias, pleurodynia, and myalgia. The abraded skin absorbs still more freely, and preparations of opium or morphia are applied to irritable, cancerous, and simple sores. Morphia dissolved in glycerine and spread on lint, is a useful application to a painful cancerous sore.

The hypodermic injection of morphia, originated by Dr. Alexander Wood, is now extensively employed to relieve pain, produce sleep, prevent spasm, and for other purposes, and is preferable to the administration of the drug by the mouth. Its action is more rapid its effects more permanent; and it neither destroys the appetite nor constipates the bowels. At first not more than a sixth part of a grain should be injected; a larger quantity sometimes produces serious symptoms.

An injection not unfrequently causes a good deal of excitement, giddiness, even intoxication, great nausea, and repeated vomiting, followed by considerable depression. Often, indeed, the patient is unfitted for work during the rest of the day. These inconveniences, however, can mostly be avoided by keeping the patient recumbent for some hours after the injection. Belladonna seems to obviate these unpleasant symptoms if combined with morphia in the relative proportion of 20 parts of morphia to 1 part of atropia.

An injection occasionally produces redness of the face, contraction of the jaw, dyspnœa, clonic spasms of the limbs, hammering frequent pulse, symptoms which last about five minutes, followed on their decline by violent sweating. These symptoms are said to occur when the injection directly enters a vein (Nussbaum, Muhe, and Hausman). By long persistence in hypodermic injections, the system becomes habituated to opium, so that not only must the quantity be increased, but when discontinued a patient suffers the depressing effects of an opium-eater deprived of his opium. Sometimes so severe are these sufferings, that patients declare that the distress occasioned by the intermission of the injection is worse than the pain itself. The injection may be made in any part of the body; but, for the sake of convenience, it is better to chose a place where the skin is loose. A fold of skin should be pinched up firmly, and then the needle is thrust quickly through it into the subcutaneous tissue. If patients dread the slight pain of the puncture, the sensibility of the skin may be first deadened by the ether spray. Immediately after the injection, a sharp smarting pain is felt; and in many cases, a large flat weal, like that of urticaria, soon arises. If care is taken to make the solution as nearly neutral as possible, the pain is much reduced. It should be remembered that these injections sometimes leave a hard horny cicatrix; hence, it is important to inject some part of the skin covered by the clothes.

Eulenberg states that the sensibility round the punctured spot is lessened if the injection is made over a superficial sensory nerve; and that the sensibility of the whole skin territory of this nerve is somewhat blunted.

A single injection sometimes cures recent and even long-standing sciatica, facial, and other neuralgias, but it usually gives only temporary relief and the injection must be repeated from time to time.

Injections continued for days, weeks, or perhaps months, sometimes cure obstinate cases of neuralgia and its allies. Sometimes every second day, or twice a week is sufficient to mitigate the pain, and after a time to cure. A single injection frequently cures lumbago at once; but, as the mere insertion of a needle is often equally efficacious, some of the speedy cures attributed to the injection must be due to the effect of unintended acupuncture. Hypodermic injection relieves the pain of severe pleurodynia, but most cases of pleurodynia yield to milder treatment. It is particularly efficacious in the pain of renal, biliary, and intestinal colic. Although not often required, a mild morphia injection will allay severe toothache. Morphia injections are sometimes needed to relieve the pain of acute inflammations, like pleurisy and pneumonia, but are rarely required unless the suffering is severe or persistant.

Morphia injections are used to produce sleep. Morphia, subcutaneously injected acts more speedily and in smaller quantities than when swallowed.

Morphia is injected to produce sleep in acute mania, delirium tremens, chorea, etc. In delirium tremens, even when bromide of potassium and chloral have failed, an injection often speedily produces sleep. A morphia injection is useful in chorea, when the movements prevent sleep, and when wakefulness, by weakening the patient, increases the movements. Dr. Clifford Allbutt employs morphia injections in dyspepsia of an irritable kind, when the patient is spare, fretful, keen, hasty or absent in manner, with a tongue too clean, red at tip and edges, small pulse, and broken sleep.

Dr. Allbutt strongly recommends a morphia injection in the dyspnœa of heart disease, and in disease of the large vessels; in the pain of angina pectoris, and of intra-thoracic tumours. By removing dyspnœa, it permits sleep, and recruits the worn-out patient. It strengthens the heart, and so removes congestion of the lungs and face. Dr. Allbutt considers it less useful in aortic than in mitral disease. I have long employed these injections in heart disease, and can corroborate Dr. Allbutt's statements. It is hardly possible to exaggerate the relief this treatment confers on a patient suffering from cardiac dyspnœa. Almost directly on falling asleep a severe sensation of dyspnœa compels the patient to awake and set upright in bed; a patient often says that the distress from want of sleep is harder than other serious sufferings. The appetite already bad, becomes worse, lack of sleep and weakness rapidly sets in. In such a case, the comfort afforded by a hypodermic injection is almost incredible. It ensures several hours refreshing sleep, from which the patient awakes wonderfully revived, the dyspnœal attacks for the next twenty-four hours are thus warded off. The heart, thus strengthened, and in the case of mitral disease the pulse made less regular and slower, the patient's condition is not only notably relieved, but his life prolonged. It must be borne in mind that, in heart disease, this cardiac dyspnœa is often associated with another form of dyspnœa arising from dropsy of the pleura, and of the lung. The dyspnœa due to these two causes is permanent; whilst the dyspnœa due to the heart is paroxysmal, and generally occurs only on falling asleep. The hypodermic injection of morphia will not relieve permanent dyspnœa or orthopnœa—conditions best treated by incisions into the dropsical legs, to drain away the dropsical fluid. In cardiac dyspnœa, a sixth of a grain twice or three times a week, often suffices, but the dose and frequency in severe cases, must be gradually increased to a quarter of a grain each night. Doctors are often afraid to administer morphia in the case of a patient propped up in bed, with livid ears, nose, and nails, with distended jugulars, and dropsical extremeties, with weak, frequent, and irregular pulse. They dread lest the morphia should weaken the heart, make the patient worse, if not kill him outright. This fear is quite groundless, and this treatment may be employed without any apprehension of injury to the patient, even if in a rare instance it should fail to benefit.

Dr. Spender employs morphia injections to arrest the severe vomiting of pregnancy and other obstinate and dangerous forms of vomiting. An injection often arrests persistent hiccup, and sometimes puerperal convulsions; it has likewise been successfully employed in tedious labour, produced by a rigid os utero.

Dr. T. J. Gallaher, of Pittsburg, and more recently Dr. John Patterson of Constantinople, have witnessed great benefit from the hypodermic injection of morphia in cholera, even in the stage of collapse. The cramps and vomiting cease, the patient falls asleep, the skin gradually becomes warm, and the pulse returns. They employ one-fourth to one-eighth of a grain of morphia, and usually one or two injections suffice. In the early stages the patient falls asleep and wakes almost well. Dr. Patterson has employed this treatment for children.

Dr. Braithwaite has successfully given small doses of morphia hypodermically in hæmoptysis.

Dr. Buxton Shillitoe strongly recommends for carbuncles and boils the local application of an extract of opium the consistence of treacle. The extract must be thickly smeared three or four times a day over and around the swelling. Applied early, it often causes the boil to abort; or it limits its progress and eases pain. After the extract, Mr. Shillitoe applies a plaster, composed of equal parts of soap, opium, and mercury spread on thick leather. Should suppuration set in, he lets out the matter, and applies a poultice over a small hole cut in the plaster.

Dropped into the eye, laudanum, and solutions of morphia cause smarting, redness, and slight inflammation of the conjunctiva. They contract the pupil, but less so than if administered in other ways. Opium, however, is never used specifically to contract the pupil, Calabar bean effecting this more safely, easily, and thoroughly. Opium wine, dropped into the eye, is used to relieve the pain of conjunctivitis, and by slight stimulation to improve the condition of the membrane. The wine of the present Pharmacopœia, containing spices, must not be so employed, as it would aggravate the mischief; but the wine of the Pharmacopœia of 1864 must be used. Mixed with either tannin or creosote, opium is often introduced into the hollow of a painful tooth and if the pain is produced by inflammation of the exposed pulp, this application often gives relief.

A somewhat full dose of opium produces much disagreeable dryness of the mouth and throat. The same annoying symptom follows likewise on the hypodermic injection of morphia.

The preparations of opium are rarely used for their topical effect on the throat, but I think that their good effects are often due to the local action. For instance, many coughs, as in some cases of phthisis, are really produced by the condition of the throat, where it is red, inflamed, and even ulcerated,—a condition which excites much irritation, and a frequent hacking cough, especially troublesome at night. This cough is much relieved by the topical application of morphia dissolved in glycerine, honey, or treacle or some other viscid substance, which causes the mixture to linger some time over the irritable membrane. It is well known that the cough of chronic phthisis is often best treated by directing the patient to retain for some time in the pharynx a weak solution of morphia in glycerine, honey, or mucilage, so as to blunt the irritability of these parts, and allay cough. Hence, too, the excellent effects of morphia lozenges allowed to dissolve slowly in the mouth. Even in coughs entirely dependent on lung disease, opium or morphia administered so that the medicine clings for some time in contact with the structures just outside the larynx, appear to have a greater influence than when the medicine is conveyed quickly into the stomach. This result is probably due to the fact, heretofore insisted on, that drugs appear to possess remedial virtues over the organs of the body even when applied only to the orifice of the passages leading to them.

The following is a good formula to allay coughs: Morphia, one-fortieth part of a grain; spirits of chloroform, three minims in a drachm of glycerine, syrup of lemons, diluted honey or treacle, repeated frequently at times when the cough is troublesome, till the paroxysm is subdued.

It is often taught that morphia should not be given in catarrh or bronchitis. When the expectoration is abundant, and there is duskiness of the skin showing deficient oxidation, opiates or other narcotics that produce profound sleep must of course be given very guardedly, otherwise the expectoration, during sleep, may accumulate in the lungs and give rise to serious results. On the other hand we meet with cases of free expectoration, with very little rhonchus, and no signs of obstructed oxidation, and very violent and frequent cough. In such cases opiates relieve cough and lessen expectoration; for the secretion of mucus in the bronchial tubes is certainly stimulated by violent coughing, and when this is allayed the expectoration becomes much less abundant. That coughing may excite secretion in the bronchial tubes is shown by the common fact, that if a patient can restrain his cough the expectoration becomes less, without any signs of accumulation in the lungs.

Taken into the stomach, opium lessens both its secretion and its movements, and consequently checks digestion. Its retarding effect on digestion is exemplified by the well known fact, that when an opiate is given too near a meal, the food vomited hours afterwards is only very partially digested. Nay, according to Bernard a hypodermic injection may have this effect, for he found the crops of pigeons full after a hypodermic dose of morphia. Here we have a sufficient reason why opiates should not be given shortly before or after a meal, unless indeed it is intended to diminish appetite or to hinder the natural movements of the stomach.

Opiates not uncommonly excite nausea and vomiting, symptoms very apt to occur in the morning after a night dose.

Opium, or its alkaloid, morphia, is given to quell the pain of many stomach affections, and to check the vomiting which may accompany them. Thus it is useful in cancer and chronic ulcer of the stomach, and in chronic gastritis from excessive indulgence in alcoholic drinks. Morphia, in small doses, combined with tonics, taken a short time before meals, is very efficacious in removing the pain, the nausea, and want of appetite so often connected with alcoholism. In the treatment of gastrodynia with heartburn, Graves employed morphia in small doses combined with bismuth.

The effects of opium on the intestines are identical with those on the stomach; that is to say, it checks both secretion and movement, thus constipating the bowels in health and restraining diarrhœa in disease. Constipation, one of the disagreeable consequences following an opiate, is much less marked when morphia is employed hypodermically.

Some persons can never take even a small dose of laudanum or morphia without their motions becoming for a day or two of a clayey colour and their urine high coloured.

Opium, or its alkaloid, morphia, is very frequently and very beneficially given in both acute and chronic diarrhœa. It is useful in the acute forms, after the expulsion of the disturbing irritant. It is, moreover, of great use in the chronic diarrhœas of tuberculosis, dysentery, and other organic diseases.

In typhoid fever, opium, in small doses, given at night, may serve a double purpose. In wakefulness, with delirium, whether of the boisterous or muttering kind, opium will often produce sleep and thus check the delirium, while at the same time it will control or even subdue the diarrhœa.

There is a form of dyspepsia and diarrhœa which yields to small doses of opium. There is probably increased peristaltic action of the stomach and intestines, so that the food, soon after it is swallowed, is forced in a half-digested state through the pylorus into the intestines, where, owing to its crude condition, it acts as an irritant, exciting the vermicular action already acting unduly, so that a diarrhœa of partially digested food occurs soon after a meal. The patient suffers from a sensation of emptiness and hunger, which is relieved for a short time by food; but the meal being imperfectly digested, and expelled through the anus long before it can be absorbed, the system is imperfectly nourished, and these uncomfortable symptoms soon recur. The characteristic symptoms are—sinking at the stomach, relieved for a short time by taking food, and the occurrence of an evacuation of partially digested food immediataly after a meal, nay, sometimes even before it is finished, and generally at no other time. This complaint, a common form of chronic dyspepsia in children from six to twelve years of age, is quickly arrested by administering from two to five drops of tincture of opium a few minutes before each meal, a dose which seems to check the excessive muscular action, and so enables the food to tarry a sufficient time to undergo digestion. Still more effective in such cases is arsenic.

Colic of the intestines is well combated by small doses of opium or morphia frequently repeated. As this painful affection is generally accompanied by, and is dependent on, constipation, a purgative should likewise be given. The opium assists the purgative by relaxing that contraction of the intestines which hinders the passage of the intestinal contents.

Opium quiets the intestinal movements in inflammation of the peritoneum and of the intestines, or in wounds of the abdomen.

Opiates are administered by the rectum for a variety of purposes. Laudanum is usually injected mixed with an ounce of decoction of starch, at a temperature of 100° or thereabouts, and is very effectual in checking acute and chronic diarrhœas; and in those severe forms of diarrhœa which sometimes carry off young children in a few hours, a laudanum injection is often the speediest way of controlling the dangerous flux. When other methods fail, the same injection often checks the purging of typhoid fever, or of tubercular ulceration of the intestines or of dysentery. It is highly useful in pain of the bowels and of the organs in the neighbourhood of the rectum. Thus an opiate injection will generally subdue the pain and frequent micturition of cystitis, and the pain arising from various uterine diseases. A suppository of opium or morphia is sometimes introduced into the rectum as far as the finger can conveniently carry it, but the injection of the laudanum and starch is more effectual.

Opium mixed with gall ointment is an excellent application to painful bleeding piles, and to fissures of the anus which cause excruciating pain with each evacuation. Mild purgatives should be simultaneously employed.

Opium injected into the rectum is absorbed and affects the distant organs of the body. A rectal injection will sometimes induce sleep when the ordinary method of administering it by the mouth completely fails. In obstinate forms of dyspeptic sleeplessness, or the wakefulness of convalescents from acute disease, the injection of laudanum by the rectum will often prove successful. Both Dupuytren and Graves state that in delirium tremens and traumatic delirium, this mode of giving opium is preferable to its administration by the mouth. The dose of laudanum injected into the rectum must depend on the nature of the case. If employed to relieve local pain, a small quantity will generally suffice; but to produce sleep, a dose must be given about threefold or fourfold that administered by the stomach—at least, so it is generally taught; but an ordinary medicinal dose, even when given by the rectum,—well cleared out previously by a simple enema or a purgative,—is often amply sufficient to ensure sleep.

The active principles of opium readily pass unaltered into the blood; for whether the opium is swallowed or injected under the skin, the same symptoms are induced.

To one unaccustomed to opium, a small dose produces "a soothing and luxuriant calm of mind, followed in the course oi forty or fifty minutes by a disposition to sleep; if this does not happen, it gives general repose to both body and mind. The pulse at first quickens, slightly, in ten to twenty minutes by eight to ten beats; but in half or three quarters of an hour, it again falls; at first it is made stronger and more resistent. The mouth and pharynx are dry, and perspiration often breaks out. Larger doses, as from two to three grains, generally at first produce much excitement, with noises in the ears, and closely contracted pupils. The ideas are confused and extravagant, and decided delirium may occur; the head feels heavy and full, the senses are blunted, and then follows sleep which is often heavy, even stertorous, and harassed by disagreeable dreams, while the pulse, at first full and frequent, soon becomes slow.

The susceptibility to the action of opium, and the symptoms it produces, vary greatly in different persons. Some are so easily affected by opium, that even a small quantity endangers life; a susceptibility so extreme is, however, not common. In some it produces only disagreeable feelings and ideas, in others just the reverse; in some the stimulant effects predominate, in others the narcotic.

After a poisonous dose, the primary stage of excitement is very brief, and narcotism rapidly supervenes. Great giddiness and a sensation of oppression come on, with an irresistible craving for sleep. There may be both nausea and sickness. The sleep soon passes into profound insensibility, the breathing grows slower and slower and more and more shallow, till it ceases. The face is pale, or livid and bloated, and the veins swollen. The pulse, at first full and strong, becomes small, feeble, and thready. The pupils are very greatly contracted. The power of swallowing is gradually lost, the pupils become insensible to light, the muscles relax, and the patient cannot be roused from his state of profound insensibility. Mucus collects in the throat, and at last, the breathing ceasing, death takes place. Patients may die in a state of collapse, and not from asphyxia, though death usually happens from paralysis of respiration.

In opium-poisoning a variety of other symptoms occasionally occur, as diarrhœa, diuresis, convulsions (most common in children,) lock-jaw, even dilated pupils, sometimes one being dilated while the other is contracted, and itching and dryness of the skin.

In some respects opium poisoning stimulates apoplexy, drunkenness, and uræmic coma.

Opium poisoning may be generally discriminated from apoplexy by attention to the following points:—history of the attack, odour of breath and vomited matters, the patient's age, and the state of the pupils, which in apoplexy are very generally dilated, and are often unequal.

Only cases of profound intoxication put on a superficial semblance of opium poisoning. In each case there is great insensibility. If the drunkard can be roused, he answers questions incoherently; but if poisoned by opium, although he is slow to speak, yet his answers are rational and to the point. The breath and vomited matters will very often tell if alcoholic drinks have been taken; but it must be recollected that suicides by laudanum not uncommonly take the drug in beer or other drinks, but even then the odour of the laudanum may generally be detected. In opium poisoning the pupils are much contracted, but in profound drunkenness the pupils are widely dilated. Moreover, the early symptoms of the attack are sufficient to insure discrimination between opium and alcoholic poisoning.

Uræmic coma may occur very suddenly and without any, or scarcely any dropsy. To distinguish such a case from opium poisoning, the history of the attack should be ascertained. A patient in uræmic coma can generally be roused partially when some information can be extracted from him. An analysis of the urine, moreover, may throw much light on the case, while the state of the pupils precludes suspicion of poisoning by opium.

Effusion of blood into the pons varolii will produce symptoms almost identical with those of opium poisoning; thus in both cases there is profound insensibility, with closely contracted pupils, and slow stertorous breathing. It may be impossible to discriminate between these two conditions till a post-mortem examination reveals the real cause of death.

In poisoning by opium, *use the stomach pump, rouse the patient, and keep him constantly moving to prevent sleep:* give strong coffee, apply *cold affusion to the head*, and if necessary, adopt artificial respiration.

It is not an uncommon practice to give brandy or wine to a patient recovering from the effects of a poisonous dose of opium, with the view of overcoming drowsiness; but having watched the action of alcohol under these circumstances, I always found that it greatly increased the sleepiness, and in fact did harm.

In this country the habit of opium-eating is not so largely indulged as among Asiatics; but it is practiced here in some localities to a startling extent. It is taken for its primary stimulating effect, but after a time increasing doses are needed to produce this result. Though carried to a very great pitch, opium-eating in some individuals induces neither physical nor mental weakness, while others waste, and grow physically and mentally weak, irritable, fretful, and desponding, especially when the opium is withheld; the memory is much impaired; the skin becomes sallow; but, strange to say, in many cases the bowels are not constipated.

The horrors which opium-eaters suffer when the drug is withheld are well known, and need not be dwelt on here; so great indeed is the suffering that few have sufficient resolution to relinquish the habit. The amount of opium taken is often enormous. De Quincey took 320 grains daily! Moderate indulgence of the habit is perhaps not more prejudicial to health than tobacco smoking. The Chinese are almost universally addicted to the habit of opium-eating, and yet they are an intelligent and industrious race.

Barnard's experiments lead him to conclude that opium depresses the functional activity of the sympathetic system, and notably that part supplying the submaxillary gland. Gscheidlen considers that opium affects the terminations of the motor

Opium will of course relieve or abolish pain yet in the treatment of chronic cases it is right first to exhaust all other methods; for the opiate soon loses its influence and must be given in increasing quantities, until the patient becomes accustomed to it and is unable to discontinue it without great discomfort, even after permanent removal of the pain.

Opium, especially when employed hypodermically, often relieves pain and ensures sleep in acute rheumatism.

Opium is often of signal use as an antispasmodic. Its action in this respect, as well as its narcotic power, is much enhanced if given with a stimulant, as alcohol, ether, or chloroform.

Laudanum or morphia is of marked service in the convulsive stage of whooping-cough. A sufficient dose should be given to a child to produce very slight heaviness, which state should be maintained by giving one-fiftieth of a grain of morphia every three or four hours, or a proportionate dose every hour. A quarter of a drop or two drops of laudanum, according to the age of the child, must be given every hour. This treatment often quickly removes the whoop, and reduces the severity and frequency of the cough; but in the case of any irritation, as of teething or of worms, tuberculosis or much bronchitis, this remedy, like most others, is of little or no use. (See Belladonna, Lobelia, Bromide of Potassium).

Opium and its preparations are beneficial in renal and biliary colic. Morphia answers best when employed hypodermically. If administered by the mouth, small doses of the opiate combined with spirits of chloroform, should be administered every five or ten minutes, till the pain gives way.

Opiates are also beneficial in cases of asthma; yet with some asthmatics, morphia will induce a paroxysm of dyspnœa.

Opium is very useful in diabetes to control inordinate appetite; the diminution of quantity of ingested food reduces the kidney excretion, and abates the troublesome thirst. It was at one time thought that this was the only way opium proved useful in diabetes, but it has been lately shown that large doses frequently repeated, will greatly lessen and indeed remove the sugar from the urine, the diet and the appetite remaining unchanged.

Opiates are also used in spasmodic stricture.

Opium and its preparations are reputed to check the secretion from all the mucous membranes of the body, and on this account are given in bronchitis to check excessive secretion of mucus and pus.

Opiates are employed as diaphoretics.

Ten grains of Dover's powder at bed time will generally check the night sweats of phthisis and other exhausting diseases, even when other remedies like zinc have failed.

It is well known that opium, in a small dose taken at night, if resorted to at the commencement of the attack, will cut short a cold in the head. Some attribute its efficacy to its influence on the skin, and Dover's powder is very generally employed. Two or three drops of laudanum taken at bed-time, is often sufficient at once to abolish a threatening attack of cold in the head. A glass of hot grog assists the action of the opium.

Laudanum, especially when mixed with tincture of nux vomica, is very serviceable in some of the distressing symptoms which afflict hysterical women, or nervous, overworked, anxious men. Both men and women, but chiefly women about forty or fifty years of age, are apt to complain of a sensation of great weight and heat on the top of the head, with frequent flushings of the face, suffusion of the eyes, hot and cold perspirations, and sometimes shooting pains passing up the back of the head. The pain occasionally centres in one brow, with much heaviness and torpor after meals, and now and then the sensation as of a tight cap on the vortex, or dull aching pain in the same part, with inability to fix the attention, and much depression of spirits. These symptoms may generally be traced to a variety of causes, as dyspepsia, especially the flatulent form, heart-burn, uterine derangements of various kinds, or unhygienic conditions. In any case, however, a drop of laudanum, with two of the tincture of nux vomica, repeated three or four times a day, will generally dissociate the foregoing symptoms from the disease with which they are connected, to the great relief of the patient.

Morphia occasionally produces an eruption, sometimes like that of measles, at other times like that of nettle rash; it may be accompanied by distressing itching, sufficient often to counteract the anodyne properties of the medicine.

Tincture of opium in a large dose (ʒj) mixed with brandy is recommended in profuse flooding after parturition, accompanied with much exhaustion of the uterus.

The influence of opiates on the urine of diabetes has already been pointed out.

The preparations of opium diminish the water and urea of much less marked; again, it is said that with respect to animals, narceine is the most soporific of the alkaloids, but its action on man is far less than that of morphia.

The investigations of Claude Bernard have led him to arrange the constituents of opium into three classes,—namely, the soporific, the convulsant, and the toxic; and he thus classifies the constituents in the order of their activity:—

Soporifics.	*Convulsants.*	*Toxics.*
Narcein	Thebaia	Thebaia
Morphia	Papaverine	Codeia
Codeia	Narcotine	Papaverine
	Codeia	Narcein
	Morphia	Morphia
	Narcein	Narcotine

For further remarks on the action of thebaia, codeia, narcotine, and morphia, see Strychnia.

NUX VOMICA. STRYCHNIA. BRUCIA. THEBAIA.

The three alkaloids, strychnia, brucia, and thebaia, appear to exert a similar action on the spinal cord, so that for convenience sake they are grouped together; but it should be stated that strychnia is more powerful than brucia, and brucia than thebaia. Our succeeding remarks apply mainly to nux vomica and its alkaloids, as thebaia has not yet been put to any therapeutic application.

Formerly it was sometimes the custom to blister the skin over paralyzed muscles and to apply strychnia to the raw surface, in the hope of producing a greater effect on the diseased muscles than by swallowing the medicine. This method, superseded by the hypodermic injection, has now fallen into disuse.

The late Dr. Anstie recommended the hypodermic injection of strychnia in one-hundred and twentieth of a grain-doses to relieve the pain of cardialgia and gastrodynia. There is, he says, "no such remedy for gastralgia as this."

Mr. Charles Hunter advises the injection of strychnia hypodermically in cerebral, spinal, and other forms of paralysis. About one-eightieth to one-sixtieth of a grain, administered twice or three times a week, will, he says, after three or four injections, almost always show if strychnia manifests any effect on that particular form of palsy. The injection produces a general warmth or glow of the skin, lasting a few hours, felt most in the paralysed limbs and down the spine; it removes the sensation of heaviness or weight and the muscular twitchings, spasms, or cramps and may induce sweating, especially of the palsied parts. Most of these results I have myself witnessed.

Mr. Barwell employs strychnia hypodermically in essential paralysis of children and eccentric paralysis of adults; in loss of motor power from pressure on a nerve or from debility after exhausting diseases, as diphtheria, scarlatina, or low fevers; and in the latter stages of lead or gout paralysis. In opposition to the experience of Mr. Hunter, he objects to the use of these injections in cerebral and spinal paralysis. Mr. Barwell injects from one-twentieth to one-twelfth of a grain, and employs a two per cent. solution, believing that of this solution a larger dose may be injected with safety than a corresponding dose of a weaker solution. I have often injected the same relative dose of the pharmacopœia solution without inducing any of the toxic effects of the drug. The injection should be made into the muscles every second day, or even daily.

Dr. Julian Chesolm employs hypodermic injections of strychnia in eye and ear diseases, beginning with one fortieth of a grain, daily increasing the quantity till in fifteen to twenty days one-sixth or one-fifth of a grain is reached, and no benefit may take place till these larger doses are administered. As we meet with idiosyncrasies in respect of strychnia, it is well to begin with a small dose. He employs these injections in muscular asthenopia, amblyopia, tobacco amaurosis, and in progressive nerve atrophy not dependent on intra-cranial disease. Dr. Werner finds strychnia by injection useful in traumatic amaurosis. Perhaps these large doses given by the stomach might prove just as serviceable.

The preparations of nux vomica have an intensely bitter taste, and like other bitters augment the flow of saliva.

They produce a sensation of hunger but there is no evidence that in a healthy person either strychnia or any other bitter substance increases the digestive power. Like other bitters, and perhaps in a greater degree, these preparations by their slight irritant action, check unhealthy deviations of the gastric mucous membrane and may in this way promote digestion. The action of bitters and especially of the tincture of nux vomica, far the best and most agreeable agent for this purpose, is well shown in certain perverted conditions of the digestive canal. For example, in the course of chronic diseases, such as bronchitis, dilated heart, or cirrhosis of the liver, the tongue not unfrequently becomes thickly coated with a white fur, and the symptoms indicate chronic catarrh of the stomach; one or two drops of the tincture of nux vomica in a teaspoonful of water, every two hours or oftener, from twenty-four to forty-eight hours, will often clean the tongue, improve the digestion, and at a critical time clear the way for the administration of nourishment. Again, during early convalescence, when the tongue still continues coated and the digestion weak, nux vomica will prepare the way for stronger tonics and more liberal diet.

This treatment greatly mitigates the annoying flatulence and indigestion occurring in cases of mechanical obstruction of the circulation in the digestive organs, as from cirrhosis and dilated heart; indeed, nux vomica is more or less serviceable in flatulency of any kind. Heartburn, also frequently yields to small quantities of the tincture given three or four times a day.

Nux vomica is of great service in a group of symptoms, including weight at the pit of the stomach after food, acidity and heartburn, flatulence, accompanied by heat and weight at the top of the head, the last symptom occurring usually in women, especially about middle age. This dyspeptic condition is often benefited by five drops of the tincture of nux vomica taken about a quarter of an hour before food three times a day. The heat and sensation of weight on the top of the head, even when occurring independently of any gastric disturbance, often yields to the same treatment.

In acute gastric catarrh, accompanied by "sick headache," the action of tincture of nux vomica is sometimes very marked. This common and troublesome complaint is sometimes traceable to error in diet, or constipation, but it occurs often without any apparent cause. Headache is often the most prominent symptom, the nausea being very slight, amounting only to mere qualmishness. A drop of the tincture in a teaspoonful of water, taken every five or ten minutes, to the extent of eight to ten doses, and then continued at longer intervals, often quickly mitigates and in a few hours removes this kind of headache which otherwise would continue all the day.

The tincture or extract of nux vomica has long been employed to correct constipation, habitual or temporary. The extract, mixed with other remedies, such as rhubarb or colocynth pill, should be taken daily shortly before dinner, to aid digestion and the proper unloading of the bowels. The same effect may often be obtained by giving one or two drops of the tincture twice or three times a day. As our knowledge of the action of nux vomica in its relation to constipation is at present imperfect, the results appear to be capricious. It is as well, therefore, not to be too sanguine of success; for in some cases it answers beyond all expectation, while in other apparently similar cases it completely fails. If the bowels are habitually sluggish, the patient should take occasionally, early in the morning, half a tumblerful of some natural purgative water to assist the nux vomica. Should the tardy action be due to insufficient supply of bile, the motions being pale in colour, nux vomica will fail, and other medicines are required.

Strychnia, as Mr. Savory has shown, is much more poisonous when injected into the rectum than when swallowed, a curious difference, not due to the digestion and destruction of the alkaloid by the gastric juice, since Mr. Savory has proved that this secretion exerts very little, and probably no effect, upon strychnia.

Strychnia and other active principles of nux vomica quickly enter the blood, as is shown by the rapidity with which a poisonous dose is followed by characteristic symptoms. Moreover, the alkaloid can be extracted from the blood and urine, a conclusive proof of its absorption.

A large and poisonous dose produces symptoms very closely resembling those of tetanus. The first symptoms are general uneasiness, with restlessness and soreness of the limbs. Shooting pains like electric shocks occur in various parts of the body, often first in the back, and down the arms and legs. Tetanic and paroxysmal contraction of the muscles soon set in, and these symptoms grow rapidly worse, and make the body rigid while the paroxysm lasts. The respiratory movements are completely arrested, so that the face becomes bloated and livid, the jugular veins stand out in the neck, the eyes are staring and prominent, the jaws firmly clenched, and the pupils dilated. Each spasmodic attack lasts from a few seconds to a minute or more, and then generally ceases altogether for a time. Throughout the paroxysms, the mind is quite unaffected, and the patient's sufferings are agonizing. A breath of air, a slight noise, movement of the bed-clothes, the most trivial cause, will excite tetanic spasms. In a fatal case death is rapid: but if the patient should survive two or three hours, sanguine hopes may be entertained of his recovery. A fatal termination may be due either to exhaustion from the repeated convulsions, or to asphyxia from spasms of the muscles of the chest.

Brucia, thebaia, and most of the opium alkaloids affect the body in the same way.

The symptoms of strychnia poisoning differ from those of tetanus in the following particulars:—from the first, the poison-symptoms are very strongly marked and rapidly reach their worst, perfect intermissions occur, and death soon takes place, or the symptoms rapidly decline, and the patient recovers.

Treatment of poisoning.—*Stomach pump*, if available in time, for after tetanic symptoms have set in, the introduction of the tube would excite a paroxysm. *Animal charcoal.* Tannin solution of iodine. *Chloroform inhalation.* Injection of curare or of methyl and ethyl compound of strychnia, of brucia, or of thebaia. Artificial respiration. Fats.

Leube and Rosenthal find that pulmonary insufflation arrests strychnia tetanus by increasing, as they supposed the absorption of oxygen. Brown-Séquard confirms these statements concerning insufflation, but contends that the arrest of convulsions is due to the mechanical effect produced by the forcible impact of the air upon the ramifications of the vagus, of the bronchi, and of the nerves of the diaphragm exciting a reflex inhibitory action; for section of the cord above or below the origin of the phrenic nerves and section of the vagi prevent the action of insufflation.

Strychnia excites tetanus, not through the brain; for in poisoning by strychnia, the mind, to the last, remains unaffected, and between the paroxysms animals can execute voluntary movements. Nor does it tetanize through the muscles or nerves; for after division of one sciatic nerve, strychnia excites tetanus in every part of the body except in the limb supplied by the divided nerve; yet as the vessels of this limb are undivided, its unconvulsed muscles and nerves are as much poisoned by strychnia as those parts which are convulsed. As strychnia tetanizes neither through the brain, muscles nor nerves, it must act through the cord. This conclusion is confirmed by the following experiments: I. If the cord and all the vessels supplying its posterior part are cut and the animal is then poisoned, convulsions occur in the anterior portion of the body but simple normal reflex acts follow stimulation of the posterior part of the body, that part indeed under the control of the division of the cord protected from the poison by secretion of its vessels: II. If all the blood is allowed to drain from the body of a frog by section of its heart, and a small quantity of strychnia is then placed on the forward part of the cord, the anterior parts of the body become speedily tetanized and this condition slowly extends to the posterior parts as the strychnia descends and affects the rest of the cord.

After traumatic and strychnia tetanus, the functions of the motor nerves and muscles are depressed, the motor nerves conveying impressions imperfectly, and the muscles by direct galvanic stimulation contracting imperfectly and becoming stiff from rigor mortis. Kölliker has shown that this is in part due to the excessive activity these parts have been made to undergo through the strychnia. But strychnia apparently also directly depresses the motor nerves, for large doses kill without exciting convulsions when the motor nerves are found to have lost their conductivity. Moreover, if before poisoning, the sciatic nerve is divided, thus protecting the limb from convulsions, the divided sciatic loses its irritability though not so soon as the undivided nerve. Again, if all the tissues of a frog's leg except the nerve are tied, and the parts beneath the ligature thus defended from the poisoned blood, all parts become tetanized; but the convulsions cease sooner in the poisoned than in the protected leg, the motor nerves of the former having been paralysed by the strychnia-containing blood.

Harley's experiments show that the poison acts on all parts of the spinal cord, its effect on this organ appearing to be twofold. It dilates the vessels, thus increasing the supply of blood, and also augments the activity of the functions of the cord.

It is stated that traumatic and strychnia tetanus produces minute ecchymoses in the cord. This is not the case with frogs tanized by strychnia; for these animals may be tetanized for weeks without the production of ecchymoses,—a fact which proves that they are the result and not the cause of tetanic spasms.

It seems worthy of remark, that strychnia does not merely heighten the reflex action of the cord, but so affects it that impressions are not confined within their natural limits but diffuse themselves throughout the cord; strychnia in fact lessens the resistance of the cord and increases the diffusibility of impression. Strychnia is said to heighten arterial pressure by stimulating the vaso-motor centre.

Kölliker asserts that strychnia affects but little the blood of frogs.

Nux vomica or its alkaloid is commonly employed, often with great benefit, in motor paralysis. Sometimes it is administered with the view of exciting slight twitchings in the paralysed muscles, so as to keep up in them a sort of artificial exercise calculated to maintain their nutrition and prevent their wasting; but if strychnia benefited in this way, surely galvanism would effect the object better. Dr. Brown-Séquard recommends nux vomica or strychnia in those forms of paraplegia dependent on softening and wasting of the cord, when, for example the supply of blood conveyed to it is diminished through degeneration and partial blocking-up of the vessels. Strychnia is supposed to dilate the vessels and to increase the supply of blood in the degenerated tissues and thus to avert their further destruction.

Strychnia affects paralysed sooner than unparalysed muscles.

In medicinal doses strychnia is said to strengthen the heart beats. It has been shown that the heart of an animal poisoned by strychnia ceases to contract sooner after death than that of an animal destroyed by mechanical means; and further, that if a frog's heart is placed in a solution of strychnia it ceases to beat sooner than another placed in simple water. It is not said whether this organ ceases to contract in the systole or diastole. Harley states that when a solution of strychnia is dropped on a heart, its muscles become tetanic. The same authority says that both strychnia and brucia lessen the absorption of oxygen and the production of carbonic acid; in other words, they lessen the respiratory function of the blood, and if either alkaloid is mixed with blood recently drawn, the amount of oxygen it absorbs, and of carbonic acid it gives off, are less than with simple blood. Is it not probable that any substance capable of altering the physical or chemical condition of the blood will lessen its respiratory function?

Strychnia given to a rabbit with young, causes abortion; it has therefore been concluded that the drug possesses a direct influence on the uterus but there is no evidence to confirm this conjecture.

Strychnia is useful in prolapsus ani, and if the prolapsus is associated with constipation, the nux may be added to a purgative, as tincture of rhubarb. If diarrhœa occurs it should be checked, and the prolapsus will probably cease; if not, strychnia will generally succeed quickly in ridding a child of this troublesome complaint.

These preparations, especially the tincture, are often of much use in the so-called hysteria of middle-aged people. In many cases it appears to control the distressing flatulence commonly connected with this state, and to relieve the sensation of heat and weight on the top of the head; and it often removes effectually, although less surely, flushings of the face and hot and cold perspirations. It is still more effectual when combined with small quantities of laudanum.

Dr. Anstie has noticed that strychnia sometimes produces symptoms closely resembling intoxication, unsteadiness of gait, perversion of the intellect, and a meaningless smile. On one occasion I was able to connect a peculiar wandering delirium at night with the employment of strychnia though there were no tetanic twitchings.

According to Dr. Anstie strychnia promotes capillary circulation and he recommends it in troublesome coldness of the hands and feet.

Strychnia sometimes induces persistent erections, which phenomenon has led some medical men to give it in impotency and spermatorrhœa.

Large doses of strychnia are sometimes useful in spermatorrhœa, especially when associated with impotence.

Strychnia is sometimes employed with much benefit to old people with paralysis of the bladder when the water constantly dribbles away. It may also be useful in the incontinence of urine of children.

Strychnia is separated in part, at least by the kidneys. Its influence, if any, on the urine, has not yet been ascertained.

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"It is well known that curare and strychnia are derived from plants belonging to the same genus, and it is therefore interesting to observe such a relationship. It may not, however, be altogether superfluous to add that strychnia, brucia, and the other spinal stimulant alkaloids examined in this paper, have not been converted by chemical addition into curarina—the active principle of curare. The action of the methyl derivatives of these bases is of precisely the same character as that of curare, and they possess the same peculiarity of slow absorption by the mucous membrane of the digestive system, but the degrees of their activity are very different. If we confine our attention to the salts of the methyl derivatives of strychnia, brucia and thebaia, where the action is uncomplicated, we observe they form a series in which the fatal dose varies for each, while this dose, in the case of the most active of the three, is considerably above that of curare, and greatly above that of curarina. Besides, curarina has a characteristic colour reaction that belongs to none of these bodies, and the latter further proves this dissimilarity by each of them possessing special colour reactions, by which they may be distinguished from each other."

There is a distinct antagonism between strychnia and calabar bean, and between strychnia and chloral. These antagonisms have lately been investigated by a committee presided over by Dr. Hughes Bennett. Previous experimenters had shown that calabar bean modifies strychnia tetanus but is of no avail to save life, and Dr. Bennett's committee confirm the conclusions, that whilst the symptoms induced by strychnia, as tetanic convulsions, are modified by calabar bean, so far from saving life it actually aids its destruction, for when both poisons are administered together, but each in quantity less than the minimum fatal dose, their combined action in this dose will destroy life.

The antagonism between chloral and stychnia is far greater; chloral modifies the strychnia symptoms to a great extent, and as might be expected, the sooner chloral is given after strychnia the greater is the antagonistic effect. Very large doses of strychnia require very large and even dangerous doses of chloral, enough to produce dangerous symptoms. Whilst chloral antidotes strychnia, it is doubtful if strychnia will avert death from chloral. Chloral produces profound coma and destroys life by its action on the cerebral hemispheres. Strychnia does not affect these parts.

LOBELIA IN

This remedy has been both highl demned, answering with some bey to others nothing but failure discrepancy may easily be recon that lobelia has been given in ver fering sets of authorities. Unless thought to be poisonous—this remed ously imagined that lobelia is a hig drug only to be given with much ca

Lobelia is of great service in ma dependent or not on visible struct is useful in the peptic and espec These two forms are generally mo of breathing in bronchitic asthma the peptic asthma leading after bronchitis. Lobelia is I think l come on periodically, at interval weeks to a month. It may indee partly suppress the paroxysm, bu apparently unable to prevent the me to esteem lobelia higher the n hear it extolled by patients. It that in some cases it fails entire patients often say it "helps them t hardly necessary to observe that forms of dyspnœa; it is useless disease, and when the difficulty of b exertion, or from a bad fit of co palliative and not curative of the con it should be given only during a p an oncoming fit, the medicine mu doses of a drachm of the simple every half hour, or ten drops may l or quarter of an hour till the dyspnœ adopt the smaller and more freque be discontinued should sickness or d drawback is its uncertain action, so and faint by doses which others tak The risk of depression is obviated b a patient soon learns the suitable dose and periods. It is well to inform patients of the possible occurrence of sickness and faintness, which may make them feel very ill; but these symptoms soon disappear, and never, so far as I have seen, become serious or dangerous. I have repeatedly given two-drachm doses without any dangerous consequences; but this large dose generally excites a sensation of sinking at the stomach, with nausea, and not unfrequently vomiting. When the patient complains of more or less constant tightness of the chest with frequent exacerbations during the day, he should take ten minims of the tincture thrice daily, with an additional dose on the occurrence of the exacerbation. In bronchitic asthma, where the breathing is a little tight all day but much worse at night, the patient should take ten minims, three times a day with additional doses according to the state of the breathing at night. It should be given cautiously to asthmatics with heart disease, or it may render the pulse irregular and very weak. Lobelia inflata allays the dyspnœa which accompanies capillary bronchitis in emphysema.

In certain epidemics of whooping-cough lobelia is very serviceable, whilst in other epidemics it seems useless. Lobelia is useful in the spasmodic stage, and in two or three days, generally reduces by one half the frequency of the attacks, lessening their severity at the same time, the speedy subsidence and disappearance of the whoop attest the influence of this drug. Like all other whooping-cough remedies it acts best in uncomplicated cases, and when the weather is warm and mild. If the weather is cold, and the winds cutting and sharp, the child should be confined to a warm room; but under other circumstances the child should live as much as possible in the open air. For a patient two years old, I order ten minims of the tincture of lobelia every hour, and an additional dose each time the cough is imminent provided the paroxysm gives sufficient warning. Children bear large doses of the drug; for, in no instance, have I witnessed nausea, sickness, faintness, or any ill effects follow the doses just recommended. I find, indeed, that adults are much less tolerant of lobelia than children. Sometimes lobelia produces a slight burning sensation in the throat. Whooping-cough is well known to be a very obstinate and dangerous affection in children only a few months old, and in such cases lob elia often appears to do less good than to older children. I give five minims of the tincture every hour even to very young children.*

Lobelia has been praised in bronchitis; and I have tried it in several cases, but while it removed any paroxysmal dyspnœa, it appeared to be powerless over the bronchitis itself. It has been employed in laryngismus stridulus and in croup.

CANNABIS INDICA.

ALL persons are not similarly affected by Indian hemp, and race and climate have been supposed to modify its influence. Its effects are most marked on the brain, whose functions it more or less perverts in various ways. It generally produces a pleasurable intoxication, and the dosed person becomes talkative, or sings, or perpetually giggles, and objects often assume to him very grotesque aspects, exciting him to much merriment. He is possessed with a feeling of happiness and contentment, and ideas of a pleasing kind pass rapidly through the mind, sometimes unconnected and immediately forgotton; but in other instances remembered on the return to the normal state. After a time sleep sets in, generally accompanied with delightful dreams. There may be pain in the head, "a sensation as of the brain boiling over, and lifting the cranial arch like the lid of a tea-kettle." Among the early symptoms is a sensation of heaviness of the arms and legs. The head feels hot and heavy. The eyes are bright and shiny, with sometimes giddiness and noises in the ears. General sensibility is also affected, and pricking in the feet, or over the whole body with numbness, often of a pleasurable kind, is an early symptom. Pressure on the skin may excite a sensation of burning. After a time, complete anæsthesia sets in to such an extent that while standing there may be no consciousness of touching the ground. The muscular sense is even lost, and pain is lessened or removed. Sometimes it produces complete catalepsy. It often occasions a ravenous sensation, not to be appeased by food. In some instances the pulse is said to be at first rather increased in frequency and strength, but neither pulse nor breathing is much altered. The pupils contract to light. Sometimes there is strong sexual desire.

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* Mr. Foster of Huntingdon, and Dr. Howard Sargent of Boston, America, recommend clover in whooping-cough. Dr. Sargent gives a wineglassful occasionally through the day of an infusion made with two ounces of carefully dried blossoms of red clover, steeped in a pint of boiling water for four hours.

Such is the group of symptoms induced by Indian hemp, though they do not all occur in the same person, but are variously combined; and sometimes it produces sensations anything but pleasant, as nausea, vomiting, great thirst, frequent, weak, and intermittent pulse, with disagreeable sensations and ideas.

If indulged in for a long time, as is common in the East, it produces loss of appetite and strength, trembling and much mental weakness.

It is used to produce sleep, and its effects have been compared to those of opium; but it differs from this drug, it is said, in not producing nausea, constipation, or headache. Fronmüller administered it in 1000 cases, and found that it succeeded in 530; partly succeeded in 215; and produced little or no effect in 255 instances. A large dose is required to induce a hypnotic effect, as eight grains of the spirituous extract, which sometimes soon after its administration excites headache, vomiting, and giddiness; and the headache may be severe, dull, and throbbing, and accompanied by a coated tongue. Opium is a more certain hypnotic.

Cannabis indica is one of the most valuable remedies for megrim or sick headache. It appears to act on the nervous centre whence this headache springs. It is found serviceable both in cases associated with little or no nausea, and in cases accompanied by severe vomiting. It is useful in attacks accompanied with spectra. It is most useful in my experience in preventing the attacks, not in arresting them when once they have begun. It is sometimes useful in those severe continuous forms of headache lasting for weeks, (see Croton Chloral); but it is especially effective, when from fatigue, anxiety, or change of life, the attacks become much more frequent; then the drug gradually, and indeed sometimes quickly, lengthens the interval and at last brings back the attacks to their old periodicity, or even extends the intervals between the seizures. It need hardly be said that cannabis will not cure these patients. I have given this drug weeks or months continuously in doses of one third to one half a grain twice or thrice daily. As anæmia or constipation, favouring and even exciting attacks of megraine, often co-exist with it, cannabis indica may be combined in pill with either iron or aloes.

Since writing these remarks on cannabis, subsequent experience has fully confirmed the favourable opinion of it just expressed, no single drug have I found so useful in megraine. I have ventured to suggest that it acts on the portion of the nervous centre, whence these attacks spring, for cannabis appears to be useful in all varieties of megraine. It has been the fashion of late, to speak of megraine as an affection simply of the central nervous system, the paroxysms being spontaneous and wholly independent of peripheral excitation. The sickness or diarrhœa or pale stools, &c., being due to the central affection. It appears to me far more probable that the central affection remains dormant till roused into action by peripheral excitation which greatly varies in different cases. See section on counter-irritation. The following cases show that gastric irritation may cause pain in the head.

A young woman about 20, whose mother is megranous, has suffered for a month with severe throbbing supraorbital headache after every meal. The pain is severe and is increased by exertion or stooping. The eye balls ache. The pain is not accompanied nor followed by cutaneous tenderness. The sight is unaffected, with the headache she suffers from nausea, but is free from epigastric pain, acidity and flatulence. The nausea increases severely, and at last after half an hour, sometimes two hours, she vomits, and immediately the headache ceases. Her bowels are regular, and her motions of a natural colour. The pain coming on immediately after food, increasing as the nausea increases, and ceasing immediately on vomiting, certainly strongly suggests that the exciting cause is food acting on the stomach nerves.

A young man aged 20, suffered for two months from occipital headache after almost every meal. It comes on about half an hour after food and lasts about an hour though sometimes all day. On the other hand, food sometimes, and whiskey and water always, relieves it for half an hour. The headache is always accompanied by flatulence, and continues till he can pass it either upwards or downwards. In ten or fifteen minutes after freely dispersing wind, the headache leaves him. The flatus has little or no odour, and causes him no annoyance beyond the headache. When the pain is severe he can feel with his hand throbbing at the occiput, which also ceases on the escape of wind; worry or anxiety will at once bring on headache. The headache is not accompanied nor followed by tenderness of the scalp.

Bismuth and charcoal cured the flatulence, and the headache left him.

Dr. Clousden recommends cannabis indica combined with bromide of potassium in mania, giving a drachm of bromide of potassium with a drachm of the tincture of cannabis indica.

It has been found useful in neuralgia, whooping-cough, and asthma, and appears to be serviceable in some cases of hysteria. Some accord it a high reputation as a diuretic in acute and chronic Bright's disease, and consider bloody urine to be a special indication. It is said to relieve dysuria and strangury, and to be useful in retention of urine dependent on paralysis from spinal disease. It is used occasionally in gonorrhœa. It is very useful, as Dr. Silver has pointed out, in menorrhagia and dysmenorrhœa. Half a grain to a grain thrice daily, though a grain every two hours or hourly is sometimes required in those who can tolerate so large a dose, often relieves the pain of dysmenorrhœa.

ERGOT.

Ergot has a disagreeable, bitter taste, and occasions an abundant secretion of saliva. In large doses it produces nausea, vomiting, colic, diarrhœa, giddiness, headache, dilatation of the pupil, great retardation and slight weakness of the pulse.

Absorbed into the blood it causes contraction of the blood vessels, and especially those of the cord,—a statement made by Brown-Séquard and noticed in the article treating of belladonna.

Whether administered by the stomach, or hypodermically, ergot causes contraction of the arteries and veins, by its influence, it is said, on the sympathetic system. Administered in either way, it is most valuable in hæmorrhage; indeed, few, if any, remedies rival its efficacy in this respect. Dr. Currie Ritchie and Dr. Drasche were the first to use it hypodermically, and they report successfully of cases of hæmoptysis, epistaxis, hæmatemesis and intestinal hæmorrhage in typhoid fever; and many other observers have since confirmed their statements. In severe bleeding, when it is urgently necessary to check it at once, the hypodermic application must be used, in from two to five grain doses. I have seen this injection in many instances produce a good deal of swelling and pain, which, however, always subsided without suppuration, hence it is well to warn the patient that this temporary untoward accident may occur. In less urgent bleeding administration by the stomach is very successful. It is very useful in hæmoptysis, in doses of thirty or forty minims of the liquid extract every three or four hours, indeed, hourly in severe cases.

Hildebrand advises hypodermic injections of ergot for fibrous tumour of the womb; a curious measure it would seem, but it is endorsed by Drs. Keating and Ashurst, distinguished American physicians, who state that the injections at intervals of five to six grains of ergotine will greatly diminish the size of fibrous tumours. In a case reported by Dr. Keating, the pulse, respirations, and temperature fell for a time after each injection, the fall increasing with each injection; thus, after the fifteenth injection the pulse fell to fifty-six, the respirations to twelve, and the temperature to ninety-six. (?) The ergotine excited much nausea and sickness, due probably to the effect of the ergot on the womb, for the introduction of the finger into the os uteri increased the vomiting. The occurrence of nausea and sickness, however, is not usual.

Ergot is strongly recommended in purpura.

If taken for a long time it is said sometimes to produce fatal consequences, namely spasmodic contractions of the muscles, and now and then gangrene of the extremities, in character generally like senile gangrene. These statements usually made in therapeutic works must be very greatly exaggerated, as we now administer considerable quantities of ergot for weeks or even months without producing gangrene or spasm.

Its effects are most expressed on the womb, especially when pregnant, exciting in the gravid uterus powerful and continuous contractions. It is used in tedious labours, when the uterus is becoming exhausted, but must not be employed when there is obstruction to the passage of the child, otherwise it may occasion serious damage to the delicate structures of the mother. Many suppose that it endangers the life of the child in two ways, namely, by subjecting it to powerful and continuous uterine pressure, and by weakening its heart. This injurious pressure may be avoided, it is said, by administering the medicine in small doses, so as to strengthen the natural contractions of the uterus, but not to make them continuous. It is recommended to watch its action on the fœtal heart, and if the pulsations fall to 110, or the beats become irregular, either the drug should be discontinued or the delivery effected by instruments.

It is extremely useful in post-partum hæmorrhages, arresting the bleeding by producing firm contraction of the uterus, and by its influence on the blood-vessels. It is also of great use in the various forms of menorrhagia, even when it depends on uterine tumours. It is perhaps the most valuable medicine known in uterine hœmorrhage, checking the bleeding when other remedies have failed, and when the patient is reduced almost to a hopeless state. In such critical circumstances it must be given in full doses, and be repeated every hour or two. It promptly checks, and in a few hours effectually stays, the bleeding. Dry cupping over the sacrum is useful. Perfect rest should be enjoined. [See Perchloride of Iron.]

It is said that ergot will arrest sweating.

Ergot is said to reduce the temperature of the body, but most observers doubt the truth of this assertion. The hypodermic injection is said to reduce the temperature of cats and dogs.

It is stated to be useful in neuralgia and paraplegia, whooping-cough, incontinence of urine, and even in some cases of leucorrhœa; but the form of leucorrhœa is not mentioned. It is also recommended in amenorrhœa with anæmia, after the use of iron.

TEA. COFFEE. COCOA. GUARANA.

THEINE, caffein, cocoine, guaranine, are chemically and physiologically identical. Large doses of these agents produce in animals paralysis of sensibility, tetanic spasms and convulsions.

The physiological committee presided over by the late Dr. Hughes Bennett, conclude that these substances paralyze the terminations of the sensory nerves and the posterior columns of the spinal cord, the anterior columns remaining unaffected. The tetanic spasms are probably spinal though, owing to the paralysis of the sensory nerves, the spasms cannot be excited by peripheral irritation. The motor nerves are unaffected These substances cause cerebral excitement, affect the respiration, the heart's action and the arterioles. Breathing is first excited, then impeded and at last arrested; the heart's action is first quickened, strengthened, and then slowed and weakened; the arterioles first contract and then dilate and induce stasis of the blood. They increase the flow of saliva and excite tenesmus with slimy motions. They usually contract the pupil. They first lower and then raise the bodily temperature. To some extent they are antagonistic to morphia. It is very desirable these experiments should be confirmed.

In poisoning by tartar emetic or the alkaloids a strong infusion of tea is sometimes used for the sake of its tannin which precipitates these substances.

In flatulent dyspepsia few substances are more to be avoided than tea. It is harmful in two ways; for tea itself in this complaint is found to promote flatulence; and women, the chief sufferers from this disagreeable form of dyspepsia, are apt to drink large quantities of weak tea, and the excess of fluid keeps up the distension.

Coffee is to some persons slightly purgative.

The active principle of tea and coffee is absorbed, and acts as a stimulant to the nervous system. These beverages are especially useful in a fatigued state of the system and under ordinary circumstances are preferable in this respect to alcoholic drinks.

"Coffee" says Dr. Parkes, in his work on Hygiene, "is a most important article of diet for soldiers, as not only is it invigorating, without producing subsequent collapse, but the hot infusion is almost equally serviceable against both cold and heat; in the one case the warmth of the infusion, in the other the action of the skin, being useful; while in both cases the nervous stimulation is very desirable. Dr. Hooker tells us that in the Antarctic Expedition the men all preferred coffee to spirits, and this was the case in the Schleswig-Holstein war 1849. The experience of Algeria and India (where coffee is coming more and more into use) proves its use in hot climates." The same authority, speaking of tea, says, "Tea seems to have a very decidedly stimulative and restorative action on the nervous system, which is perhaps aided by the warmth of the infusion. No depression follows this. The pulse is a little quickened. The amount of pulmonary carbonic is, according to E. Smith, increased. The action of the skin is increased, that of the bowels lessened. The kidney excretion is little affected; perhaps the urea is a little lessened, but this is uncertain."

"As an article of diet for soldiers, tea is most useful. The hot infusion, like that of coffee, is potent against both heat and cold, is most useful in great fatigue, especially in hot climates (Ranald Martin), and also has a great purifying effect on water."

Dr. Fothergill finds that caffein strengthens the contractions of frog's hearts, and M. Jaccoud believes that it acts on the heart and blood vessels like digitalis, strengthening the heart and increasing arterial pressure.

Tea and coffee are useful in the headache of nervousness and exhaustion, and as an aid in rousing and keeping a patient awake in opium poisoning.

A small cup of very strong coffee is often very useful in the paroxysm of asthma; in fact it gives relief in most cases but in very unequal degree.

Although tea and coffee are very wholesome beverages, yet either one or the other or both, will in some persons occasion palpitation of the heart, sleeplessness, and mental excitement.

Coffee in certain individuals increases rather considerably the urinary water, and is said to lessen the formation of urea, and so to check metamorphosis; but Dr. Squarey's careful experiments disprove this conclusion with respect to urea.

Dr. Wilks recommends guarana for sick headaches,* being induced to try it by Mr. Helmken of British Columbia, and Dr. Wood of Montreal. Dr. Wood recommends it when the pain affects the right side of the head. It shortens the attacks and increases the interval between them. A powder should be taken every night, and on the occurrence of an attack every three hours. Guarana consists of the seeds of paullinia sorbilis, growing in Brazil, and contains an alkaloid identical with that in tea and coffee.

CINCHONA AND ITS ALKALOIDS.

Salts of quinia are protoplasmic poisons, arresting amœboid and the allied movements of the white corpuscles. Even weak solutions are highly poisonous to protozoa and infusoria (Binz), more so even than salts of strychnia or morphia. Small quantities of quinia salts destroy septic germs and arrest putrefaction more thoroughly than most antiseptics, including even arsenic and creasote. With the exception of strychnia, quinia, moreover, hinders alcoholic and butyric fermentations more than other bitters. Cinchona possesses the same properties, but in a weaker degree than quinia.

Powdered bark contains, besides various alkaloids, a considerable quantity of tannin, a fact to be borne in mind when we administer bark, or any of its preparations.

Finely powdered bark dusted thickly over foul, indolent, sloughing, and even gangrenous ulcers, and left to form a kind of poultice, has apparently promoted the healing process. Hospital gangrene too has been successfully treated in this way.

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* Galvanism is sometimes useful in an attack of sick headache. Dr. Anstie uses the constant current, and he cautions against the use of more than five or at most ten cells. With the interrupted current I have often succeeded in lessening the pain and removing the "stupid feeling" so often complained of during an attack.

Bark has been employed as a dusting powder to check profuse formation of pus, mucus, or the secretion of eczema. Its success probably depends on the tannin it contains, and other and cheaper preparations of tannin might prove equally useful.

Cinchona bark and its preparations are bitter to the taste, and like all bitter substances, stimulate temporarily the salivary glands. The tannin of the bark precipitates the mucus of the mouth, and acts likewise as an astringent to the mucous membrane itself.

Powdered bark is a common constituent of tooth powders.

The alkaloids, when swallowed in an insoluble form, combine with the acids of the gastric juice and become soluble, so that as a mere solvent, it is unnecessary to administer quinia and cinchonia with acids. A large dose merely suspended in fluid is far less bitter than when dissolved.

The alkaloids of bark probably undergo no other change in the stomach than that just mentioned. Their action in the digestive tract is similar to that of bitters generally, being slight irritants to the mucous membrane, and so producing, both in the mouth and stomach, an increase of mucus. It is generally stated that cinchona increases the amount of the gastric juice for a short time, to a small extent, and further experiments show that cinchona and its alkaloids check the action of the gastric juice on the food, and check also fermentations, as that of sugar by yeast. It appears therefore that cinchona increases for a short time the production of both saliva and gastric juice, and so in a small measure may aid digestion; that it is an irritant to the mucous membrane, and promotes the secretion of the mucus of the mouth and stomach; and that it checks the digestive action of the gastric juice and fermentation.

Thus our theoretical knowledge would appear to show that quinia neither increases appetite when the stomach is healthy, nor aids in any marked degree digestion, yet experience fails to support these views; for even when the stomach appears to be healthy, quinine certainly seems to sharpen appetite and assist digestion, particularly in the case of elderly people and the inhabitants of large towns.

These substances are useful to check unhealthy or excessive fermentation in the digestive canal.

These alkaloids if too long employed disorder the stomach, producing heat and weight at the epigastrium, loss of appetite, nausea, sickness, and even diarrhœa. Poisonous doses excite great thirst, burning pain at the epigastrium, and vomiting.

Quinine appears to exert no influence on the secretion of bile.

These alkaloids affect the intestines in the same manner as they affect the stomach.

They are given with benefit in cases of worms; but as decoction of cinchona appears to have no direct influence on ascarides and tæniæ, the good effects of quinia must be due to its beneficial effect on the mucous membrane, by preventing the production of the abundant mucus which favours the development and growth of these worms.

When quinia is taken in large quantities, some of it is said to pass off with the fæces.

Quinia readily passes into the blood, and as it can be detected unchanged in the urine, sweat, and secretions of healthy persons and fever patients, probably very little undergoes decomposition in the body. It is almost exclusively eliminated by the urine, most of it being excreted in six hours.

Large doses affect the sight and hearing, and excite subjective noises, as of bells ringing in the ears, and occasionally produce deafness. Sometimes, but very rarely, the sense of hearing has been lost for life; but usually, in a short time, possibly in a few days, the noises cease, and the hearing again becomes natural. Large doses often dim the sight, and sometimes cause total temporary blindness. I have noticed on some occasions, that the defect of vision is strangely limited to one eye, or begins first in one eye. The pupil of the affected eye is very generally dilated and sometimes to an extreme extent. Severe frontal headache, with dull, heavy, tensive, and sometimes agonizing pains are some of the most distressing and frequent symptoms that follow a large dose of quinia. While these symptoms last and indeed, generally before they appear, the face is flushed, the eyes suffused, and the expression is dull and stupid. Even small doses in persons very susceptible to the action of this medicine, will produce some of the foregoing symptoms, especially the headache and mental disturbance.

A small dose of quinia in one of my patients always brings out a uniform red rash over the whole body, most marked on the back of the neck, accompanied by very severe stinging pain, especially on the nape, and in the clefts between the fingers. Desquamation as free as after a sharp attack of scarlet fever always follows the rash.

Quinia in large doses abolishes reflex action before voluntary movement, by stimulation of Setchenow's reflex inhibitory centre.

It has become somewhat the practice of late to treat pyæmia, acute rheumatism, typhus fever, etc., with oft-repeated large doses of quinia, even to the enormous extent of several drachms in the day, yet without producing any of these toxic symptoms. Workers in barks sometimes suffer from a scaly papular eruption, or from a vesicular weeping eruption, and occasionally from great swelling of the genitals or of the face and eyelids, with redness of the eyes. They sometimes complain of great itching of the whole body, and it is known that quinia can produce urticaria.

The statements concerning the influence of quinia on the pulse are discrepant. It is often said, that large doses reduce, while small doses increase, the number of beats.

Mr. Gill and I investigated the effect of large doses of quinia on the pulse and temperature. Our experiments were conducted on a boy aged ten, convalescent from rheumatic fever, and a healthy girl of thirteen.

Before experimenting on the girl, her pulse beat from sixty to sixty-four; and the following table shows the effects of a daily dose of quinia:—

Dose.	Rise began.	Reached.
gr. 8	in 85 minutes	94
,, 10	,, 15 ,,	72
,, 12	,, 95 ,,	72
,, 20	immediately	120
,, 20	in 50 minutes	96

In the last observation the pulse for about the first thirty minutes fell in frequency; but this did not occur in the other instances. We shall mention presently the depression in the temperature; here it is necessary only to state that the pulse was at its fastest when the quinia began to depress the temperature. The increase in the frequency continued after—

gr. 10	170 minutes.
,, 20	195 ,,
,, 20	Did not fall much.

In every instance there was a loss of force with increase in the frequency. Briquet has shown by the aid of the hæma-dynamometer that the lateral pressure of the blood on the arteries is lessened in proportion to the dose of quinine.

The effect on the boy's pulse was different, for his pulse beat 112 to 120 in the minute. The rheumatism from which he had recovered had left a mitral regurgitant murmur, and had probably damaged the heart's substance. On one day two doses of ten grains each were given him without on either occasion altering the frequency of the pulse; in each case, however, its strength was diminished. On another day, after taking a single dose of ten grains, the pulse fell during fifty minutes from 108 and 112 to 104 and 96, growing at the same time in strength. After this it attained a frequency of 120 in the minute, and again fell in force. On two occasions the girl's pulse, when at its quickest, became irregular both in force and rhythm.

Mr. Gill and I investigated at the same time the influence of quinia on the temperature of fever-free persons. The following table shows the results of our observations:—

Boy.		Girl.	
Dose.	Effect on Temperature.	Dose.	Effect on Temperature.
gr. 10	None	gr. 8	Fell 0·2°
,, 10	Fell 0·2°	,, 10	None
,, 10	None	,, 10	None
		,, 20	Fell 1°
		,, 20	Fell 0·4°

It appears that quinia will reduce the temperature, but to effect this in any appreciable degree large doses, to the extent of twenty grains, must be given, and even then depression is but slight, and may not amount to half a degree Fahrenheit.

It may be said that the fall in the temperature does not represent the total effect of the quinia, as a rise in the temperature would have taken place at the time the depression occurred, so that if we wish to ascertain the integral influence of the quinia we must add to the amount of depression the rise which should have happened; but to this I am able to answer that on this point I made many careful experiments, and found that the heat of the body remains always very constant between nine a.m. and four p.m., and the foregoing observations were made between these hours.

This table gives the time the depression occurred after the quinia, and the period it lasted. The occasions when the fall reached only 0·2° are not included, since even with the greatest care, so slight a depression may easily be produced by accidental causes.

Dose.	Time.	Depression lasted.
gr. 20	in 55 minutes	3 hours 15 minutes.
,, 20	,, 80 ,,	45 ,,

Several observers have made observations tending to show that quinine has perhaps some influence, though assuredly to no marked extent, in reducing the body temperature in health.

Piorry maintains that during a fit of ague quinine at once diminished the size of the spleen, and it is said that the drug exerts a similar effect on this organ during other fevers and even in health.

The influence of cinchona and its alkaloids on the various forms of intermittent fever is well known, controlling this formerly common complaint more effectively than any known drug. How it acts is at present quite unknown. It has been supposed to check the fever by its influence on the spleen; but, granting this assumption, it yet remains to show how the influence of the quinia on the spleen prevents the return of the fever paroxysms.

Quinia generally arrests the disease at once. It is well, however, to bear in mind that this remedy may dissociate the other symptoms from the elevation of the temperature; or, in other words, it may remove the shivering, sweating, quick pulse, while the temperature may remain as great, or nearly as great, as on previous days. Mere rest will occasionally effect the same dissociation. Unless the unnatural elevation of temperature has been restrained, the paroxysms will speedily return. This fact it is necessary to recollect, otherwise it may be concluded that with the removal of the more obvious symptoms the disease itself is cured, and thus the patient may be permitted to return to his usual avocations.

A still more curious circumstance remains: that is, quinia may check all the symptoms, even the periodical elevation of the temperature, and yet about the same time of day that the series of symptoms were wont to take place, an increase in the urea and urinary water may occur as marked as during a severe paroxysm; that is, all the symptoms of the paroxysm are absent except those pertaining to the urine.

I made two experiments which tend to show that quinia, given after the commencement of the fit, is powerless to prevent the elevation of temperature of that attack, although the drug may effectually prevent the rise in succeeding paroxysms. It is said that quinia subcutaneously employed after the paroxysm has begun, will arrest the fit. Some hold that quinia is less efficacious than the powdered bark, even when the cinchonia is allowed for, and it is even held that powdered bark is more tonic than quinia. On the other hand, no doubt powdered bark, by reason of its bulk, and of the tannin it contains, frequently upsets the stomach.

There is great variation of practice regarding the administration of quinia, some giving small doses, several times daily; others preferring a single large dose daily; both methods are useful, but under different circumstances. In the mild forms of ague, like those now met with in this country, small doses several times daily are sufficient; but in malignant forms, large doses, given even several times a day, may be required summarily to arrest the disease. Some say the drug should be given at the very commencement of the fit; but this practice is held to be bad by making the immediate attack more severe.

Trousseau advised that fifteen grains should be taken immediately after the fit, and repeated with an interval, first of one, then of two, three, and four days, and so on. Probably this is a good means to extirpate the latent tendency to the disease and to ensure a perfect cure; for it must be recollected that, judging by the temperature, a patient may unconsciously undergo even a severe fit, a fact proving the great importance of employing the thermometer. Moreover, Trousseau's plan is judicious; for even when the quinine has removed all symptoms, the patient is liable to a recurrence of the attack from various causes, as depression of the health, or a sudden shock, as that from an accident or operation; indeed, in many instances, this tendency to ague lasts for years.

It is important to recollect that the effect of quinia on the fit bears no relation to its physiological operation, either in time or degree, for a small dose may prevent the occurrence of a fit otherwise due twenty-four hours afterwards, the effects of the dose on the system meanwhile never becoming apparent, or having long ere this passed quite away.

Quinia is of especial use in the malignant forms of ague. The dose should be large, and given in a non-febrile period. In these severe forms of the disease, no circumstances are to be considered as contra-indicating its use. If it cannot be borne by the stomach, it may be given by the rectum or hypodermically. For injection it is recommended to dissolve the quinine in ether as this solution is less irritating than an acid, alcoholic or chloroformic solvent. Salts of quinidine on account of their solubility have been recommended for hypodermic use. Quinidine of commerce is generally very impure.

In remittent fever, large and often-repeated doses should be administered during the remission.

The more recent the attack, the sooner and more certainly will quinia cure.

It is less efficacious in quartan than in other forms of ague, probably because old ague generally assumes the quartan type. In obstinate cases resisting quinia, arsenic often succeeds.

In some cases where this medicine appears powerless the administration of an emetic each morning sometimes brings the disease at once under the control of quinia.

Quinia is used as a preventative of ague, and in the navy it is a very useful sanitary precaution, where this fever prevails, to give sailors sent ashore quinia before and after landing. This preventative effect is forcibly illustrated in some observations recorded by Dr. J. B. Hamilton, of the Royal Artillery, who treated his men with quinia, and but few succumbed to ague, and those were attacked mildly; whilst another doctor, disbelieving in the preventive action of quinia, allowed his men to go unprotected by quinia, and a large number were struck down with fever and several died. Dr. Hamilton believes that cinchona is superior as a prophylactic to quinia, and quinoidia very inferior to quinia.

The other alkaloids of bark, although inferior to quinia, will check ague. Cinchonia, it is said, must be given in doses one third larger than quinia.

The Medical Committee appointed by the Indian Government to estimate the relative value of the alkaloids, cinchonia, quinia, quinidinia, and cinchonidinia, decided in favour of the use of all of them in ague. Naturally, there were individual differences of opinion concerning their exact relative value, but all agreed that they are all efficacious against ague. The general opinion was that sulphate of quinia and sulphate of quinidia possess equal febrifuge power; that sulphate of cinchonidia is only slightly less efficacious; and that sulphate of cinchonia, though considerably inferior to the other constituents, is a valuable agent in fever.

It is a fact well known that in the case of persons who have encountered ague, even many years beforehand, that disease in them is prone to take on an intermittent type, and that in such instances quinia is often of great service.

Again, certain forms of neuralgia not uncommonly depend on malarial poison, and are then apt to assume a type distinctly periodical. Here quinia in large doses given shortly before the expected attack is highly serviceable. Quinia often proves useful too in non-malarial forms of neuralgia, presenting this periodical character. Even when the element of periodicity is quite absent, large doses of quinia often succeed in removing the pain of this distressing malady. Quinia is said to control neuralgia and ordinary face-ache more effectively when the powder is taken in minute quantities every few minutes,—for instance, as much as will adhere to the finger's tip dipped into the powder.

It has long been recognized that quinia has most influence on neuralgia of the supra-orbital branch of the fifth—a branch most often affected with malarial neuralgia and non-malarial periodic neuralgia; but even non-periodic neuralgia of this branch is probably more amenable to quinia than neuralgia of the other branches of the fifth or of other nerves.

A short time ago it was the custom to treat pyæmia with large doses of quinia, under the notion that quinia produced great reduction in the temperature; but I am convinced that the falls were often normal, occurring in the course of the disease, independently of the action of quinia. In pyæmia a sudden and extensive rise of the temperature often occurs twice or three times a day, to fall again, however, in a few hours to the natural or almost natural standard.

Quinia is recommended in other febrile diseases, as typhoid fever, bronchitis, broncho-pneumonia, pneumonia, and acute phthisis. Numerous observations prove that large doses effect a temporary reduction of temperature, occasionally a considerable fall.

In Germany, quinia treatment, originally introduced by Vogel, is largerly adopted in all fevers, especially in typhoid fever. Liebermeister who follows him gives large doses of 20 to 45 grains at nightfall, so as to increase the morning fall down to the normal, or nearly normal temperature. If the dose is inadequate to effect this, he increases it. He strongly insists on the necessity of giving the quinia in one large, rather than in several divided doses, as the piecemeal method has far less effect on the temperature. After very considerable experience he avers that he has never seen these large doses, produce any injurious effects. The decline of the temperature usually beginning a few hours after taking the medicine, and the minimum temperature is reached in from six to twelve hours. The combination of the cold bath with quinia is strongly recommended by some observers, as the quinia reduces the number of baths necessary to keep down the fever.

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contractions of the womb during
preference to ergot. Other write
but on the rather inconsequent g
pregnancy as for ague, quinia doe

Quinia is often employed wit
malnutrition, as in impetigo and
benefit to the pale and badly fed
towns. It is at present undeterm
are dependent on its action on th
after its absorption into the blo
mended in passive bleeding, un
struation, spermatorrhœa, and in

Quinia appears to be useful in some cases, but quite useless in others, of intermittent hæmaturia.

Quinia is found in the blood, which dissolves more of it than water; in the saliva, bronchial mucus, milk, and in dropsical effusions. It is said to be eliminated slightly with the sweat; although Briquet, after giving large doses, could detect none.

Both quinia and cinchonia pass off in part by the urine, but a portion appears to be consumed in the blood, or to be eliminated in some other way. Kerner says that "a respiratory power of 3,000 c. c. can destroy fifteen grains of sulphate of quinia in twenty-four hours; any amount over this will pass into the urine." Quinia appears in the urine of healthy individuals in the course of two to five hours, but more quickly in young than old persons. In some diseases (intermittents, pulmonary emphysema, pneumonia, morbus Brightii) its exit is much delayed, and in three cases in which large doses were given, Dietl detected it in the urine many weeks after the last dose, showing that it is not easily destroyed in the body.

Dr. Ranke has made the important observation, that a scruple of disulphate of quinia lessens by one-half the excretion or the formation of uric acid, the effect continuing about two days after a single large dose, the other constituents of the urine remaining unaffected. It would seem likely that the uric acid is not simply retained in the system; for as in Ranke's cases no subsequent increased excretion took place after the effect of the quinia had gone off, its formation was absolutely lessened, or it must have been converted into some other substance. (Parkes *on Urine*).

Certain circumstances modify the operation of the salts of quinia. The physiological symptoms appear early in young people who can resist the toxical action of the drug; but on the other hand, the effects of quinia are more marked in old people. Diffusible stimulants, as wine and coffee, are said to counteract the action of quinia.

SALICINE. SALICYLIC ACID. SALICYLATES.

Salicylic acid is a powerful antiseptic. Wagner maintains that it is a more powerful disinfectant of wounds than carbolic acid. It is said to be three times more effectual in preventing fermentation than carbolic acid. Kolbe asserts that salicylates possess no antiseptic properties, the apparent contradictions to this statement being due to the specimen used containing some free acid.

Salicylic acid is useful as a local application to prevent fœtor to gangrenous and offensive smelling sores.

These substances produce many of the effects of quinia, and like it they have been recommended to reduce the febrile temperature. But whilst in many respects they produce similar effects on the animal body to quinia, they cannot, as we shall subsequently see, be substituted for it.

In conjunction with Mr. Bury, I have made some investigations concerning the action of salicine on the human body, using healthy children for our experiments, to whom we gave doses sufficient to produce toxic symptoms.

We tested the effects of salicine in three sets of experiments, on three healthy lads. To the two first we gave large doses and produced decided symptoms; to the third we gave at first smaller doses and increased them gradually till he took three drachms daily, producing, as we shall see, scarcely any symptoms.

In order to produce any symptoms characteristic of the drug, a single large dose of one drachm or more is necessary, or thirty grains repeated hourly, two or three times. Given less frequently, or in smaller doses, it induces no symptoms whatever. Toleration of the drug is soon established, so that at last large doses fail to produce any characteristic effect; though when given at first, without any graduation, these full doses, even after their discontinuance, produce very decided symptoms, which may persist one or two days, and may even become intensified the day after the withdrawal of the medicine. The repetition of large doses may produce slight fever, shown in delaying and greatly lessening the evening normal diurnal fall—an effect probably due to irritation of the stomach.

The aspect of a patient under full medicinal doses is rather characteristic, being in many respects similar to that of a person suffering from cinchonism. The expression is dull and heavy, the face quickly flushes on slight excitement, and the eyes become suffused. The flush, of rather a dusky hue, suffuses itself uniformly over the whole face. The patient, made more or less deaf, often complains of noises in the ears. He complains, too, of frontal headache, and his hands, when held out. tremble a little. His breathing is rather quickened and deepened. In some cases one symptom may predominate; thus deafness may be almost complete, without headache or muscular trembling; but it rarely, if ever, happens that any symptom is unaccompanied with the dull heavy aspect and the readiness to flush.

Under toxic, but not dangerous doses, the headache is often very severe, so that the patient buries his head in the pillow. There may be very marked muscular weakness and tremor, associated with great muscular irritability, so that a slight tap, say on the shoulder, causes muscular contractions so strong as to jerk the arm backwards. There are often slight spasmodic twitchings when a limb is raised. Tingling of the extremities or other parts of the body sometimes occurs. The voice may become thick and husky. The respiration is hurried, sometimes deepened, sometimes sighing and shallow and almost panting, as though it were performed rather laboriously, but the patient does not complain of any difficulty of breathing. The costal as well as the diaphragmatic movements are involved in the exaggerated breathing. Large doses, often repeated, quicken the pulse to 140 per minute, and it becomes very weak. In these healthy lads the drug did not cause delirium.

It is very noteworthy that salicine renders the sweat neutral or alkaline. We think, too, that the urine becomes neutral or less acid; but on this point our observations are too few to justify our speaking confidently. The alkaline reaction of the sweat we noticed in many rheumatic patients under the influence of large and frequent doses, and the sweat may be alkaline, whilst the urine is acid.

Subsequent observations incline me to doubt if this alkaline reaction of the sweat be due to the salicine; for in a good many observations on the reaction of the sweat in health and disease, I find that the sweat is often neutral or even alkaline.

We find that if moderate doses are first given, the medicine may then be increased, till a lad ten years old, beginning with 80 grains, may be brought to take 180 grains daily, without any symptoms.

Salicylic acid and the salicylates produce the same symptoms. In my experience the acid produces these symptoms in much smaller doses than the alkaloid.

Salicine is converted in the body into salicylic acid and possibly this acid produces the symptoms. The alkaloid will not, of course, yield its own weight of acid, hence its effect in producing symptoms is less manifest than the acid.

Other symptoms than those just described have been observed when salicylic acid has been given in disease. Thus Dr. Tuckwell, in addition to most of the symptoms just mentioned observed delirium like delirium tremens, involuntary evacuation of urine and fæces, slow laboured pulse, and olive-green colour of the urine. When Dr. Tuckwell first published his account all the symptoms were thought to be due to a trace of carbolic acid contaminating his specimen. Possibly the olive-green colour of the urine was due to the carbolic acid; but as salicine produces most of the symptoms enumerated, and as delirium has been noticed to occur after the use of a pure sample of the acid, these symptoms, excluding the olive-coloured urine, must be due to the drug and not to carbolic acid. Dr. Weber has seen the acid cause acute nephritis with bloody albuminous urine containing casts; this effect following three moderate doses and lasting sixty hours after the last dose. Other observers refer to similar effects with the acid, in some cases the urine being almost suppressed. Dr. Murchison and some other writers are inclined to attribute the delirium, sometimes following the use of the acid, to its effects on the urine; but this view is not tenable, since the drug will produce violent delirium without effecting any change in the quantity or character of the urine. I have never seen salicine, even when given in very large doses, produce delirium, and possibly the acid may be more powerful in this respect than the alkaloid. In addition, these substances sometimes produce sickness, and more rarely diarrhœa, so that they cannot be continued; and further, salicylic acid often causes much distressing burning of the throat. When administered in fever salicylic acid not uncommonly excites very abundant perspiration, but this did not occur in our experiments on healthy persons. While administering these remedies in rheumatic fever, some observers have seen them produce an urticarial or vesicular eruption. These symptoms, Stricker asserts, appear sooner in old and feeble than in young and vigorous people.

I shall now speak of the effect of these agents on the animal temperature, and shall first treat of the effect of salicine on the temperature in health. This subject, too, I have investigated with Mr. Bury, and our results are published in Vol. XI. of the *Journal of Anatomy and Physiology.*

Our observations show, that even very large doses, as large as can be safely given, depress the temperature very little, and only after the first few doses, and subsequently, instead of lowering the temperature, the drug produces slight fever; thus it slightly raised the temperature, though not above the limits of health, but delayed the onset of the evening fall, and lessened the amount of diurnal variation, thus giving evidence of the febrile movement. This slight fever may, we think, be due to catarrh of the stomach caused by the medicine, which, in so many instances excites vomiting.

In two sets of experiments the temperature was taken under the tongue; in the other series, in the rectum. These lads took breakfast between six and seven; dinner between twelve and half-past, and tea between four and five.

We took the temperature hourly, from 9 a.m. till 12 p.m. Observations were made hourly for six days on the first lad; on the second for eight days; on the third for thirty days. For a few days we gave no salicine, that we might compare the temperature of the body on salicine days with non-salicine days.

Our first set of experiments was made on a lad aged ten, weighing 44½ lbs. His temperature was taken under the tongue and during the investigation, he was kept in bed but was allowed to sit up in it. He was admtted with belladonna poisoning, but our observations was not commenced till some days after his complete recovery.

For the first three days he took no medicine, on the fourth we gave salicine in two doses, each of thirty grains, and on the following day a single sixty-grain dose. Observations were continued throughout the sixth day, although he took none of the drug.

The results of our observations are put into the following table:

	Maximum temperature of day.	Rise after dinner.	Rise after tea.	Evening fall begun.	Diurnal variation.	Average temperature of day.	
1st day	99·1	0·4	0	8	1·6	98·4	No salicine.
2nd day	99·5	0·6	0 5	7	1·4	98·7	No salicine.
3rd day	99 5	0·4	0·4	6	1·7	98·7	No salicine.
4th day	99	0	0	9	1·7	98·3	60 grains in two doses.
5th day	99·3	0	0·2	6	1·7	98·5	60 grains in one dose.
6th day.	99	0	0·2	9	1·9	98·2	No salicine.

In respect to this table we must first remark that the rise after dinner and tea lasted a very short time, and we think that part of this rise are due to the warm tea; for after warm drinks we have found that the mouth temperature is often considerably raised, sometimes even to the extent of a degree, remaining so a quarter of an hour or even longer.

A reference to the above table might lead to the conclusion that the effect of salicine was inappreciable or nil, but a glance at the temperature chart showed that the drug produced a manifest effect. On the fourth day, after taking three observations at intervals of a quarter of an hour, we administered by the mouth thirty grains of salicine dissolved in water at 9.45 a.m., and another thirty-grain dose at 10.50 a.m. The medicine produced a decided though slight effect on the temperature. Thus throughout the day, the temperature remained more stationary than on non-salicine days. After the first dose there occurred a fall of 0·2° Fah.; during the next hour it rose 0·4° in spite of the second dose, and the maximum temperature of the day was attained at 11.40 a m. Then instead of rising after dinner and tea, as on the previous non-salicine days, it slowly and continuously declined, so that at 8 p.m. it had fallen 0·4° Fah., then the diurnal variation commenced and amounted to 1·7° Fah. Thus the effect of the salicine on this day was to lower the temperature 0·2° Fah, and to prevent the rise after dinner and tea, effects very slight and unimportant. Next (5th) day, after three observations, we administered in one dose sixty grains of salicine dissolved in two ounces of water at 9.40 a.m. The temperature from this time gradually fell, reaching its maximum fall of 0·8° at 11 a.m., it then rose and had recovered itself at 12, and between 12 and 5 p.m. it rose 0·3°; the evening fall then began and amounted to 1·7° Fah. There was no rise after dinner, and only 0·2° after tea. Thus on this day the effect was a fall of 0·8°, lasting about two hours, and no rise after food. The amount of diurnal variation was unaffected on both the salicine days.

Next day he took no salicine, and his temperature remained remarkably uniform throughout the day, till the diurnal variation set in. The evening fall began between eight and nine, and the diurnal variation amounted to 1·9° Fah.

The drug produced no effect on the pulse or respiration.

Although on each of the two days we gave the same dose, the drug produced far more decided effects after the second than after the first dose. On the first ay we gave two thirty-grain doses at sixty-five minutes intervals; on the next day sixty grains were given at once. This difference would indicate that the drug is quickly eliminated.

The symptoms produced were slight nausea, probably due to the bitter taste of the drug; then, in a few minutes after the second dose, severe frontal headache set in, so severe that the lad shut his eyes and buried his head in his arm. Flushing of the face especially on any excitement. Slight injection of the conjunctiva, and giddiness. In an hour these symptoms had almost left him, a fact confirming the conclusion that the drug is speedily eliminated.

Sixty grains produced the same symptoms in a more marked degree. Severe headache and flushing came on in twelve minutes. Though a very lively boy, he became very dull and stupid, lying with his eyes closed, and answering questions slowly. He complained of tingling like pins and needles in his right ankle, and suffered from very decided muscular weakness, soon accompanied by muscular twitchings and tremblings of the legs and arms. At this time the pulse was much softer.

In the following table we give the time these symptoms set in and their duration, calculating from the time of taking the medicine.

	Set in.	Ceased.
Headache	12 min.	50 min.
Flushing	12 min.	1 h. 20 min.
Muscular weakness	15 min.	1 h. 20 min.
Muscular twitchings	35 min.	1 h. 20 min.
Dullness and heaviness	15 min.	1 h. 45 min.

The quantity of urine was almost unaffected, as the following table shows:

	Daily amount.
Without medicine	22 oz.
" "	22 oz.
Salicine day	20 oz.
" "	20 oz.

The next series of observations were made on a lad aged nine, convalescent from pneumonia, his temperature having become normal ten days previously. We experimented somewhat differently.

The boy was kept in bed. His temperature was taken hourly in the rectum. For two days he took no medicine; on the two following days he took salicine in thirty-grain doses at 10 a.m., 11 a.m., 2 p.m., 3 p.m., 5 p.m., and 6 p.m.; thus in the course of the day he took ʒiii. Next day we administered thirty-grain doses eight times (℥ss.), at 10 a.m., 11 a.m., 12 p.m., 1 p.m., 2 p.m., 3 p.m., 4 p.m., and 5 p.m.

The results with this lad are rather singular. On the first day these large doses produced no symptoms, in fact symptoms did not set in till noon of the second day, but they increased during the night, after the discontinuance of the medicine, and were severe all next day, and for three days after.

The temperature chart shows that on the first day the temperature rose between 9 a.m. and 1 p.m. $\frac{9}{10}$ Fah. and then slowly fell; the diurnal variation apparently beginning about 6 p.m. and amounting to 2·9° Fah. Next day, also without salicine, the course of the temperature was very singular. It remained pretty stationary from 9 a.m. till 1 p.m. and then fell 1°, remaining about this point till 9 a.m. and again fell 1·6°; the diurnal variation amounting to 2·3°. Next day, the first on which salicine was given, the temperature fell after the first dose of 30 grains ·4° in 1½ hours, and remained depressed for about 3 hours, and then rose to its original height in spite of the continuance of the medicine. The evening fall began at 7.30 p.m., and the diurnal variation amounted to 1·9° Fah. The only effect, therefore, of the salicine was a very slight and temporary depression of the temperature, not maintained by the continuance of the medicine, and the diurnal fall was not quite so great as on the two previous days, though within the limits of variation of health.

Next day, when 3 drachms of salicine in divided doses was given, the temperature was not even temporarily depressed; in fact it rose ·6° between 9 a.m. and 1 p.m., and then slowly fell ·3° till 3.30 p.m. The evening fall began between 7 p.m. and 8 p.m., and the diurnal variation amounted to 1·5°.

Next day, with very marked symptoms, though without salicine, the temperature ran the same course, rising gradually from 9 a.m. till 1 p.m., and after 4 p.m., slowly falling till 12 p.m.: the daily variation amounting to only 0·9°. On these two days the only apparent effect, therefore, of salicine was to lessen the diurnal range, with a very slight increase in the maximum temperature of the day; and, strange to say, these effects were most marked on the day following the large doses of salicine, not on the day the large doses of salicine were taken, but on the following day.

Next day, taking the temperature as usual, it remained pretty stationary, varying only ·2° from 9 a.m. till 6 p.m. and then fell, the diurnal variation amounting to 1·8°.

On the two days following the temperature returned to the course it is observed on the first non-medicine day, slightly rising from 9 a.m. till 1 p.m., the rise amounting to 0·5° Fah., and then the diurnal fall began respectively at 7 p.m. and 6 p.m., and amounted to 2·2° and 1·7°.

We now summarize our observations in the following table:

Date.	Medicine. given.	Amount.	Maximum temperature of the day.	Amount of diurnal variation.
Sept. 19	None.		99·1	2·9
,, 20	None.		98·9	2·3
,, 21	Salicine.	ʒiii	98·9	1·9
,, 22	Salicine.	℥iv	99·3	1·5
,, 23	None.		99·5	0·9
,, 24	None.		99·4	1·8
,, 25	None.		99·5	2·2
,, 26	None.		99·5	1·7

We may remark that in these observations, taken in the rectum, very little and generally no rise of temperature occurred after food—a circumstance strongly favouring a previous suggestion, that the rise after food, in cases where the temperature is taken under the tongue, is due to the hot food heating the mouth by direct contact.

In this case the pulse and respirations were greatly affected, both being considerably quickened. As was the case with the temperature, so with the pulse and respiration, the effects of the medicine were most marked the day after the discontinuance of the drug. Thus the full effects as regards the pulse and respirations and other symptoms culminated about 1 p.m. on the day following the withdrawal of the drug, the pulse at that time being 140 and the breathing 40. On the following day, that is, two days after the administration had ceased, the pulse and respirations had greatly fallen, but were still quick and next day they became normal. The pulse when frequent was very compressible, but improved in quality as it diminished in frequency.

The drug's influence on the pulse and respiration is shown in the following table:—

Date.	Medicine.	Amount of Medicine.	Maximum and minimum pulse of the day.	Maximum and minimum respiration of the day.
Sept. 19	None.		66 to 84	18 to 28
,, 20	None.		68 to 72	20 to 24
,, 21	Salicine.	ʒiii	68 to 78	24 to 28
,, 22	Salicine.	ʒiv	88 to 116	24 to 30
,, 23	None.		112 to 140	22 to 40
,, 24	None.		82 to 108	18 to 28
,, 25	None.		72 to 100	18 to 26
,, 26	None.		76 to 88	16 to 24

We now give a résumé of his symptoms. Nothing was noticed till noon of the second salicine day until the boy had taken in all ʒv. of the medicine. Between one and two we noticed that his face was flushed and he looked dull, and that there was some tremor when his hand was held out. In the evening the tremors were more marked. At 5 a m. the following day he twice vomited. On this day though he had discontinued the medicine since five o'clock the previous evening, his symptoms were very marked and for the most part of the same characters as in the other lad,—namely dulness, so that he did not seem very well to understand questions; deafness; tingling in the right ear; slight tremor of the lips on speaking and thick husky voice; breathing rather laboured; trembling of hands when held out; slight spasmodic movements of the upper limbs; slight jerks of the lower limbs when they are raised from the bed; grasping power weaker than before; much irritability of the muscles on percussion; but strange to say he never complained of headache nor buzzing. These symptoms were at their height at midday, and were so marked and the pulse and respirations so quick, that we must confess we felt a little relief when the toxic symptoms, which became far more marked than we had expected, abated, not that at any time the boy was dangerously ill, but as the symptoms progressed, after discontinuing the medicine, we did not know how long and to what degree they might increase.

Next day, that is, forty-one hours after the last dose of medicine, he was still deaf, though less so, and was dull and unless spoken to lay with his eyes half closed, and very often fell asleep. Muscular irritability had diminished and the hands and arms trembled when held out: the pulse was still compressible. Even sixty-five hours after the last dose he was still dull, rather deaf, and there was slight tremor of the hands and irritability of percussed muscles.

Next day he had quite recovered. We tested the urine frequently for salicine and found some even 95 hours after the last dose.

In our third series of observations on a lad aged ten, and weighing 64 lbs., we experimented in a somewhat different way.

We took the temperature under the tongue every three hours. For three days we administered no medicine; on the following twenty-six days we gave salicine in increasing doses, at first in 20 grain (80 grains daily), and latterly in 30 gr. doses several times daily, till he was taking in divided doses 180 grains daily. The boy got up and spent the day about the ward.

We put our observations into the following table :—

	Medicine.	Maximum temperature of day.	Average temperature of day till 9 P.M.	Average till 12	Diurnal variation to 9 P.M.	Diurnal variation to 12 P.M.	Highest pulse of the day.
1st day	None	99·2	98·66		1·1		84
2	,,	99	98·64		1·2		80
3	,,	99	98·6		1·2		84
7th day	80 grs.	99·1	98·7		1·1	1·9	88
8	,,	99·2	98·8		1·4		96
9	,,	99·2	98·7	98·4	1·4	2·2	92
10	,,	99·8	98·3	98·12	1·0	1·6	88
11	120 grs.	99·4	98·8	98·5	1·3	1·8	92
12	,,	99·4	98·86	98·81	1·3	1·8	96
13	,,	99·3	98·96	98·78	0·9	1·4	100
14	100 grs.	99·2	98·6	98·5	1·0	1·4	96
15	120 grs.	99·2	98·62	98·60	1·0	1·3	
16	,,	99·3	98·75	98·62	1·2	1·4	96
17	,,	99·4	98·48	98·32	1·9	2·2	100
18	,,	98·8	98·22	98·05	1·4	1·6	92
19	,,	99·3	98·66	98·51	1·3	1·5	88
20	100 grs.	99·2	98·7	98·5	1·1	1·7	
21	150 grs.	99·3	99·06	98·78	1·1	1·9	88
22	,,	99·3	98·81	98·67	0·6	1·5	92
23	,,	99·6	98·94	98·68	1·5	2·2	96
24	,,	99·4	98·88	98·63	1·9	2·0	
25	175 grs.	99·2	98·68	98·41	1·5	2·2	96
26	150 grs.	99·2	98·9	98·73	1·2	1·8	100
27	180 grs.	99·3	98·91	98·71	0·9	1·8	96
28	,,	99·5	99·05	98·82	1·1	2·0	96 [bath
29	,,	100·2	99·36	99·1	2·1	2·7	Had hot air
30	,,	99·5	99·11	98·91	0·7	1·8	100
31	30 grs.	99·4					
32	None	99·7	98·48	98·60	1·7	2·3	100

The preceding table shows that these large doses of salicine had no appreciable effect on the temperature. It is true that on one day the temperature rose to 100°; but that occurred during the use of the hot-air bath, employed to produce sweating, that we might test the reaction of the sweat; on the other hand the pulse was a little quickened. On the fifth day of taking salicine he complained of slight deafness, and on the tenth it is noted that the deafness had a little increased, but two days afterwards it had disappeared. Beyond the influence on the pulse and hearing, the medicine produced no apparent effects, the boy eating well, sleeping well, and indeed appearing in all respects quite well.

I shall next speak of the effect of salicylic acid on the temperature of the healthy body. Dr. Riess has investigated the action of salicylates on the healthy temperature in twenty-three experiments on seven healthy persons, and obtained in four to six hours a constant reduction of about 1° Fah. He finds that the same dose produces a greater fall in the febrile than the healthy temperature. I have made some investigations with Mr. Morshead, but the results are not so satisfactory as those with salicine, as we failed to get symptoms with the acid, though we gave large doses, as much as 160 grains in one day. This quantity did not, in the slightest degree lower the temperature; indeed, if the medicine produced any effect on the temperature it rather heightened it.

A boy aged 8, and weighing 44¼ lbs., the subject of our investigation, was convalescent from an attack of acute rheumatism complicated with pneumonia; his temperature during the greater part of the attack reaching 105° and on one occasion 106°; but for seven days his temperature had been normal before we commenced and the lad appeared quite well. Throughout the experiment we took his temperature in the rectum hourly, from 9 a.m. to 12 p.m., and carefully noted his pulse and respirations each time we made a thermometric observation. We also noted the quantity of his food. For the two first days we gave no salicylic acid. The course of the temperature on these non-medicinal days was peculiar, possibly owing to the previous illness. From 9 a.m. to 1 p.m. the temperature fell, the fall amounting to about 1° Fah.; the temperature then again rose, and remained at a normal height, about 99°, till the evening fall began, which happened later than usual in boys of his age, and was rather considerable amounting to 2·7° Fah. On the next three days we gave him salicylic acid hourly in five or ten grain doses the first day; and ten grain doses the second and third. On the first day he took 110 grains; on the second, 155 grains; on the third, 160 grains; in all 425 grains. These doses had scarcely any effect on the temperature. Though on these days the temperature differed slightly from the non-medicinal days, it may be doubted whether the difference was due to the medicine. At all events the effect was very slight, and not in the direction of depressing the temperature, but rather the other way.

The salicylic acid produced no symptoms, the boy seeming in all respects just the same as usual. Perhaps it will be said that larger doses would have had some effect, and we must admit that our observations as to temperature are not so conclusive as they might have been, had we got marked symptoms. We gave ten grain doses because, first, it is difficult on account of its insolubility, the potion is so large, to get a patient to take more, and next, during his rheumatic attack, we treated him with salicylic acid with the same dose at the same intervals of time, with the production of symptoms so marked that after he had taken 130 grains, we felt it necessary to discontinue the medicine.

Köhler finds that salicylic acid and its salt produce a considerable fall of blood-pressure, even after the division of the vagi and of the spinal cord.

It thus appears that salicine and salicylic acid depress the non-febrile temperature but slightly, and that the continuance of the medicine fails to maintain this slight depression. Are we thence to conclude that these substances exert no influence on the febrile temperature? By no means. There is no better attested fact than the power of salicylic acid and salicylate of soda, to promptly and considerably reduce an elevated temperature.

The reducing power is established by numerous observations both in Germany and in this country by Riess, Moeli, Furbringer, Ewald, Russ, Senator, &c. It has been employed in most febrile diseases, in typhoid fever, pneumonia, scarlet fever, diphtheria, &c. Many writers maintain that it is equal to quinia, but must be given in double the dose. As with quinia two methods are adopted, a massive single dose of ʒ j, ʒ iss, ʒ ij once daily, usually at night, or divided doses more frequently. Most observers recommend the massive daily dose. In a few hours it effects a reduction of 3° to 7° Fah.; the temperature can be kept low by a daily repetition of this dose. Jahn maintains that it is superior to the cold bath as an antepyretic.

Salicylic acid and its salts have been especially used in typhoid fever, and though its power to reduce the temperature in this disease is conclusively shown, it has not been proved, I think that it lessens the mortality, the mortality in Reiss' cases amounting to 24 per cent.

Most writers say that ʒ j of the acid is the minimum dose for an adult, but ʒ iss and ʒ ij sometimes produce serious collapse.

I have myself many times seen salicylic acid effect a very great reduction of the febrile temperature; and in one instance, when given to the boy, on whom we subsequently tested the effect of the acid when he became nonfebrile, ten grains hourly, till 130 grains had been taken, reduced the temperature in about twelve hours from 106° to 97°, and the temperature-reducing effects of the drug continued for a day and a half.

Though I have on very many occasions given salicine to fever patients in doses sufficient to produce deafness, headache, and muscular tremor, I have never seen the quick and great reduction of temperature that follows the use of salicylic acid.

It thus appears that like quinia and the cold bath salicylic acid produces a greater and more lasting depression of the temperature of fever than of health.

I have made some experiments conjointly with Mr. Morshead to ascertain the relative power of quinia, salicylic acid and salicine on the febrile temperature; and we find that dose for dose quinia is far more potent than salicylic acid and salicylic acid than salicine.

We chose patients with persistent fever running a very uniform course. Having ascertained this by many days' observation, taken at 3 a.m., 7 a.m., 11 a.m., 3 p.m., 7 p.m., and 11 p.m., we then on separate days gave quinia, and afterwards salicylic acid and then salicine in the same or an increased dose at the same hour. On three occasions we gave to a lad aged 9½, three doses of quinia, 20, 20, and 25 grains respectively, forty-eight hours elapsing between each dose. The temperature on the first day was 103° when the quinia was given, and it reduced the temperature to 100°, and in the evening and all next day it varied between 98° and 99°. The second dose of quinia whilst decidedly reducing the temperature had apparently less prolonged effect, the temperature rising the day after to 101°. The third dose of 25 grains produced still less effect, for though it reduced the temperature to 98°, and kept it low for many hours, at 11 p.m. on the day after the administration, the temperature rose to 103°. These doses of quinia produced no cinchonism.

We next gave 25 grains of salicylic acid without affecting the temperature in any degree, and without producing any symptoms. Next day, in two doses at two hours interval we gave 35 grains, with slight effect, the temperature falling that evening to 99°, but next morning the fever returned to the same height as before the administration of the drug. This dose produced slight deafness and drowsiness. Having ascertained that dose for dose, salicylic acid produces far less effect on the febrile temperature than quinia, we next varied our test. To the same lad, we gave five grains of salicylic acid hourly, till he had taken 120 grains, the dosing continuing from 3 p.m. of one day to 11 p.m. of the next day. When the first dose was given, the temperature was 104·5°, and so remained that evening with little variation, but it fell during the whole of the next day, in the evening standing at 99°. On the day after the discontinuance of the acid the temperature was also low, rising however, in the evening to 102°. These doses produced no symptoms except flushing and slight tremor. It thus appears that this 120 grains, given in divided doses produced only an effect on the temperature, as 20 grains of quinia given in one dose.

We then gave five grains of salicine hourly to the extent of 120 grains, but without producing any effect on the temperature, and scarcely any salicine symptoms. The experiments again showing how much more powerful in respect of its influence on the febrile temperature is quinia than salicylic acid, and salicylic acid than salicine.

To a lad aged 19, suffering from phthisis, the highest temperature of the day being 102·6°, we began on June 16 with twenty grains of salicylic acid hourly, commencing at 3 p.m., and ending at 7 p.m. June 17. He took in all 200 grains which depressed his temperature to 97° on June 16, and it remained low next day till 3 p.m.; and then rose, reaching 101·4° at 7 p.m. The salicylic acid produced very marked symptoms.

On June 18 the highest temperature was 102·4°. We administered salicine beginning at 3 p.m., and ending at 3 a.m. June 19. He took in all 200 grains without any effect on the temperature, and with very few symptoms.

On June 19 the highest temperature was 102·7°. At 3 p.m., we gave him 40 grains of quinia which produced no effect on that day, but next day it somewhat delayed the rise and apparently increased the morning fall of June 21, it produced no symptoms. On June 22, the highest temperature was 102·8°, we gave him gr. x of salicylic acid hourly, beginning at 1.30 and ending at midnight; he took in all 100 grains. This produced an equal effect on the temperature as 200 grains with marked symptoms.

On June 25, the highest temperature was 101·6°. At 1·30 we gave him 40 grains of quinia, without influencing the temperature, but he complained of headache and giddiness.

On June 29, the highest temperature was 103·8°. We gave him hourly 5 grain doses of salicylic acid, beginning at 5 p.m., and ending at 11 p.m. on June 30. He took in all 100 grains without affecting the temperature. It is noteworthy that 100 grains of salicylic acid in ten grain hourly doses, produced as much effect on the temperature as 200 grains in 20-grain hourly doses, and that in five grain hourly doses, continued to the extent of 200 grains, the temperature was unaffected. Salicine is supposed to act by being changed in the system into salicylic acid; now if this be so, then seeing how much less is the effect of salicine, as compared with the same dose of salicylic acid, we must suppose that much of the salicine escapes unchanged, or that salicine loses considerably in weight, through its conversion into salicylic acid.

These remedies are now largely employed in rheumatic fever. Dr. Maclagan of Dundee first recommended salicine in this disease. Salicylic acid and the salicylates have since been also employed, and the almost unanimous opinion of the profession has confirmed the strong recommendation of Dr. Maclagan. Unsuccessful cases, it is true, have been reported, and cases of rheumatic hyperpyrexia that have ended fatally in spite of these remedies; but it is not to be expected that salicine nor any other remedy will be successful in every case of rheumatic fever; moreover, in many of the reported unsuccessful cases, the dose was far too small, so small and inadequate indeed that it could have little or no effect on the disease.

Each substance is useful in rheumatic fever. We shall speak of their effect separately and first of salicine.

Dr. Maclagan insists on the necessity of giving large doses frequently, or as he terms it of quickly "saturating the system," and advises a dose of twenty to thirty grains every two hours. Improvement he says becomes apparent in twenty-four to forty-eight hours, and the mitigation of pain is one of the earliest signs of improvement. Subsequent observers have, in the main, confirmed his statements. I have employed salicine in rheumatic fever in several cases with very considerable success. Thus, in eight cases reported by Mr. Bury, the temperature became normal on an average on the 6th day of treatment, and 16th of the disease.

My experience completely confirms Dr. Maclagan's recommendation regarding the dose. Little or no good follows small doses, and thirty grains every two hours are required to make an impression on rheumatic fever, and even this dose sometimes fails, and then thirty grains hourly are called for—a dose that generally produces the salicine symptoms in a mild degree, namely some deafness, dulness, and the peculiar breathing due to this drug.

We are indebted to C. W. Brown, late House Physician at the Boston City Hospital, for the most valuable and extensive investigation into the action of salicylic acid on rheumatic fever. He records 160 cases taken indifferently, the patients being of each sex and of all ages between 13 and 61.

The drug gave considerable relief from pain on an average in 1·46 days, and complete relief in 2·8 days. The average time of treatment was 6 days, and the average number of days in Hospital was 18 days. "Two cases died, one from pericarditis, and one from cerebral complications. Eighteen cases had a relapse, three had two, and one had five while in the Hospital. There were very few cases in which there was not occasional pains for a time after the omission of the acid." Nausea and vomiting occurred in 18·8 per cent. Burning in the stomach occurred in one case, headache in six, singing in the ears in nineteen, and deafness in ten, numbness and pricking of the affected parts in three, delirium in three. "Nearly all of the cases in which nervous symptoms were manifested, were those of persons in poor physical condition. The patients were placed under treatment soon after admission into Hospital, and as a rule took ten grains of the acid hourly for twelve or thirty-six hours, when the symptoms were wholly or partially relieved, and then either the acid was omitted or given every two or three hours.

Stricker recommends 20 to 30 grains every hour for six hours or 7 to 15 grains hourly, the acid being continued some time after the fever has subsided.

Owing to the insolubility of salicylic acid, salicylate of soda has lately been largely employed, and with great success. It may be given in the same dose as the acid, or rather larger. Its disagreeable taste is a serious drawback in its use. Dr. Cavafy reports twenty-one cases treated by the salt. He gives 30 grains every two hours, but he says "much larger doses have been given with good results, 40 to 60 grains every hour for six doses being not uncommonly employed without disadvantage." He, like other observers, has noted that the susceptibility of patients to these remedies varies greatly, and hence, during their use, the patient should be well watched. In his cases, "in the majority the pain was abolished, and the fever subsided simultaneously within twenty-four to thirty-six hours.

It is claimed, for these remedies, that they lessen heart complications in rheumatic fever. No exact observations have been made on this question, but, as Dr. Maclagan observes, it is obvious that a remedy, which greatly shortens the duration of the disease, must lessen the risk of complications. It does not, however, afford perfect protection to the heart, as several cases of pericarditis are recorded where this complication set in after the patient was well under the drug's influence. This, indeed, we should expect, as the pericarditis is similar to the inflammation of the joints, and whilst this lasts, risk of heart complication must be encountered.

I may draw attention to a fallacy to which I think most of the reporters regarding these substances have not paid sufficient heed: nearly all state that in twenty-four to forty-eight hours, these agents exert a marked influence on the temperature and pain. In all the recorded cases I have met with the patients were treated in hospital, and on admission were at once put upon salicylic treatment. Now it is well known that the movement of the joints during the journey to hospital considerably increases both pain and fever, and that during the first two days in hospital the pain greatly diminishes, and the temperature falls one to two degrees. When the patients have been at once put under salicylic acid treatment, this improvement in the pain and fever, due to rest, has been credited to the drug. In my observations, I always allowed two days to elapse after admission, before beginning the treatment.

Which preparation is most efficient in rheumatic fever? It is at present impossible to decide this question, since most observers' experience has been mainly restricted to one preparation only. If, as seems probable, they all ultimately assume the same form, probably that of salicyluric acid in the blood, and when thus converted manifest activity, they will be, of course, equally successful, if given in equivalent doses. My experience has been chiefly with salicine, and I must say that whilst it acted very efficaciously, it did not produce any of those disagreeable symptoms which I have seen follow the use of the acid in other diseases. Moreover, owing to the solubility of salicine, it is more readily administered than the acid, and is far less disagreeable than salicylate of soda, moreover, there is no danger of its containing the impurities not uncommonly met with in salicylic acid.

Salicylic acid and salicylate of soda have been employed in many other febrile diseases, as pneumonia, scarlet fever, and especially typhoid fever. Salicine and its compounds, as I have shown, do certainly reduce the temperature of febrile diseases. But it has not yet been proved that these remedies can shorten the duration, or lessen the mortality of a febrile disease; indeed, the mortality in the reported cases of typhoid fever is high, and this is attributed by Rees to the severity of the epidemic. Gotthammer, after testing salicylic acid in 56 cases of typhoid, seems to hold this medicine in little estimation.

Several observers have employed salicylic acid in ague with contradictory results. Several obtained no benefit, whilst others find that it cured a minority of the cases, being most serviceable in recent cases. It seems useful occasionally as an adjuvant to quinia, Sarzance having obtained good results from a combination of these remedies.

Ebstein and Julius Müller report two cases of diabetes mellitus cured by salicylate of soda. They do not vaunt this remedy as a specific, but the two interesting cases they cite, after a prolonged trial of various drugs, notably of carbolic acid, got well under the salicylate of soda.

Da Costa employs salicylic acid in five grain doses to correct the foul breath and offensive expectoration sometimes occurring in phthisis. Berthold of Dresden narrates a case which yielded promptly to salicylic acid, after the failure of turpentine inhalations, and large doses of quinia.

Berthold has likewise employed salicylic acid topically in "catarrhal stomatitis," and in thrush. He calls attention to the anæsthetic virtue of the acid in stomatitis, in calming the gnawing, burning pain of the erosions after the rupture of the vesicles. The solution he uses is, one part of acid dissolved in sufficient alcohol to 250 parts of water.

Salicylic acid has been used with good results as an injection (1 to 300) in the dysenteric diarrhœa of children.

Weber has tried this group of remedies in gout without much result; and in several puerperal cases, endo-metritis, and septicæmia, with rapid abatement of the temperature, and relief of the cerebral symptoms.

Salicine and salicylic acid may be readily detected in the urine, sweat, saliva, and sputa, by the purple colour produced on the addition of a drop of the solution of perchloride of iron. It appears in the urine in four or five hours, and seems to undergo speedy elimination, though a trace may remain four days after the discontinuance of the medicine.

It is stated that these substances appear in the urine in the form of salicyluric acid.

CALUMBA.

Calumba is used as a tonic to increase appetite and digestion. Like most bitters, it exerts a slight irritant action on the stomach, and owing to this property it is said to obviate slight changes in the mucous coat of the stomach, and in this indirect way to assist appetite and digestion. Being easily tolerated, it is employed when the stomach is weak, as in convalescence from an acute disease, when calumba is often borne with benefit while stronger tonics fail.

GENTIAN.

Gentian is used for the same purposes as calumba. It is reputed to be slightly purgative.

Mixed with infusion of senna, it is useful when a tonic and purgative are required.

QUASSIA.

Quassia is poisonous to some of the lower creatures, as flies, and other insects.

Like the preceding substances it is a tonic. It has been used in intermittent fever.

Infusion of quassia is a very useful injection in ascarides. It is also efficacious for the same purpose when administered by the mouth.

CHAMOMILE.

These flowers contain both a volatile oil and a bitter substance, and thus to some extent combine the properties of bitters with those of ethereal oils.

In a case of accidental poisoning by chamomile, the symptoms were diarrhœa of white putty like stools, coated tongue, intense headache, with a sensation of pressure within the cranium.

Chamomile is not often used as a tonic. An infusion is sometimes employed to assist the action of emetics.

In the ordinary summer diarrhœa of children, often occurring during teething, characterized by green, many-coloured, and slimy stools, the infusion in doses of half a drachm or a drachm often proves very useful, especially when given at the commencement. This medicine is likewise efficient in other kinds of summer diarrhœa. It also subdues restlessness and peevishness. A mixture is easily prepared by steeping four to six heads of chamomile flowers in a tea-cupful of boiling water for an hour, and then giving a teaspoonful hourly.

It has been used in intermittent fever, in neuralgia of the fifth nerve, and is a popular remedy for "sick headache."

CHIRETTA.

Chiretta is a tonic. When given to promote appetite, it should be taken a short time before food, as, like other bitters, its effects soon wear off.

CASCARILLA.

Cascarilla has a warm, agreeable, bitter taste, and is a stimulant as well as a tonic. It may be used like chiretta to promote appetite. It has been employed in intermittent fever and in dysentery.

ORANGE-PEEL.

Orange-peel contains both a bitter principle and much volatile oil, thus combining the properties of bitter substances with those of ethereal oils.

ELATERIUM.

This drug has a very bitter taste, and excites free secretion of saliva.

It is a powerful drastic hydrogogue cathartic. Its activity is due to elaterin, a chemically indifferent substance like the resins, and incapable of forming salts with either acids or bases. It often produces colic, and not unfrequently vomiting.

In large doses it may excite inflammation of the stomach and intestines, and even of the peritoneum. It is given as a purgative, especially in dropsies. By carrying off a large quantity of water the dropsy sometimes reduces; it is thus used both in ascites, and in the dropsy from kidney or heart disease. It must be borne in mind that free purging is very exhausting, and that elaterium very often disorders the stomach, and spoils the appetite. It is a medicine to be given with caution.

Dr. Hyde Salter strongly recommends purgatives in dropsy depending on aortic obstructive, or regurgitant disease. He says that although we cannot alter the heart, we can lessen the quantity of blood it has to propel, and thus diminish the congestion on which the dropsy depends. He employs elaterium, and advises a small dose at first, say one-sixth of a grain, to be given alternate mornings at about five a.m., so that the purgation usually ceases by ten or eleven. This treatment, he says, quiets the heart, relieves the dyspnœa, lessens the pulmonary congestion, and thus diminishes the hydrothorax.

COLOCYNTH.

This drug has an intensely bitter taste, and occasions an abundant secretion of saliva.

It produces diarrhœa, colic, and sometimes vomiting. The diarrhœa is watery, and, after large doses, serous, mucous, and bloody. In large doses it may excite gastro-enteritis and peritonitis.

It is chiefly used as a purgative, but almost always in combination with other substances. In obstinate constipation it is a good plan to give a few drops of the Prussian tincture several times a day.

It has been used as a drastic cathartic in dropsies, and, like most other powerful purgatives, it has been used for worms, although it has no direct poisonous influence on them, but merely expels them mechanically. Purgatives, therefore, are not good anthelmintics.

ALOES.

Aloes has been used as a slight stimulant to wounds, and when thus employed it often purges. "Dr. Gerhard, of Philadelphia, found it the medicine best adapted for endermic uses, as its application does not irritate a blistered surface very powerfully. Ten grains of aloes thus employed produced five or six stools, which were generally accompanied by griping. Infants are purged by the milk of nurses who have taken aloes."—Stillé.

Aloes is reputed to be a tonic, and to increase the secretion of bile.

Dr. Rutherford confirms Röhrig's statement, that when introduced into the duodenum of a fasting dog, aloes greatly increases all the biliary constituents though it purges but slightly.

It is chiefly employed as a purgative. It acts mainly on the large intestine and rectum. Its action is slow, and six, twelve, or even twenty-four hours may elapse before it operates. It produces bulky motions, a little softened, but not watery. It evidently acts but little on the mucous membrane of the intestines, and is merely a fæcal evacuant. It often occasions slight griping, and sometimes tenesmus. As its action is tardy it is injudicious to combine it with more speedy purgatives. It is well suited for cases of chronic constipation; for its activity is not lessened by habitual use, and it is even said that the dose may be gradually decreased. Sulphate of iron is said to heighten its action.

When both a tonic and a purgative are required, aloes, like senna, may be usefully mixed with some bitter, as gentian. Purgatives, it is said, act in smaller quantities when combined with tonics.

Aloes in a variety of combinations is in common use as a laxative in habitual dyspepsia, with constipation. The compound decoction of aloes, formerly called baume de vie, is a serviceable after-dinner laxative. The basis of many dinner pills is one grain of watery extract of aloes. A dinner pill containing one grain of watery extract of aloes combined either with extract of nux vomica, extract of gentian, or extract of cinchona, is very useful.

In habitual constipation, aloes is the best and most commonly employed purgative. Dr. Spender of Bath, extols the following pill, taken at first three times, then twice, and afterwards once a day; one grain of watery extract of aloes, and two grains of sulphate of iron. This pill takes some days to act. Aloes has been accused of producing piles, and in full or over-doses will no doubt aggravate this disease; but most authorities are inclined to attribute piles to the constipation aloes is employed to remove, and not to the aloes itself. Indeed, I am convinced that in many cases moderate doses of aloes, just sufficient to gently relieve the bowels, are highly useful in piles.

By its action on the rectum, aloes affects sympathetically the neighbouring pelvic organs, as the uterus; and given at, and just before the menstrual period, is useful in many cases of amenorrhœa and deficient menstruation. We cannot here refrain from citing the admirable remarks of Dr. Graves on amenorrhœa and its treatment. "The periodicity of this function," he says, "can still be traced, even in cases where suppression has continued for a great length of time, by means of the menstrual molimina (pains in the loins, thighs, and hypogastric region, flushings, colicky pains of the abdomen, general feeling of *malaise*), which occur at stated intervals; in endeavouring to bring on the discharge, therefore, we must be guided as to the time the attempt should be made, by an observance of the period at which these molimina occur. For a few days before that time our efforts to produce a determination of blood to the uterus may be judiciously employed; and if they fail, the attempt should be abandoned until a few days before the next menstrual period. Of course, I here speak of the general constitutional treatment, for this must be constantly persevered in; one of the chief means of bringing back this evacuation being the restoration of health to the natural standard. In some, this is to be effected by a tonic, and in others by an opposite mode of treatment.

". . . What I wish to impress on your minds is, that all those remedies, as pediluvia, stuping of the genitals, leeches to the inside of the thighs, near the labia, aloes, and other stimulating purgatives, etc., should be only used at the times already spoken of. To use them at any other period, either after the molimina have disappeared, or during the intervals between them, tends, in most cases, still further to derange nature, by determining to the uterus at an unseasonable time, when there is no natural tendency to that organ. Under such circumstances the very same means will frequently fail, and prove injurious, which, applied so as to coincide with the time of the natural effort, would have been successful. To illustrate these principles by an example:—We are consulted in the case of a young woman affected with various hysterical symptoms for several months, and during that period more than usually subject to headache, languor, loss of spirits, diminution of appetite, and irregularity, and usually constipation of bowels; she is pale, and complains of various pains and uneasy sensations, and has not menstruated since the accession of these symptoms. Here it is evident that the constitutional treatment must be strengthening and tonic. The practitioner will therefore recommend regular hours, much passive exercise in the open air, a nutritious diet, and afterwards cold shower-baths; he will regulate the bowels, and afterwards prescribe a course of tonic medicines, chalybeates, preparations of bark, strychnia, etc.; he will likewise inquire carefully when the last period happened, and when, and how often since that occurrence, menstrual molimina were observed. He thus ascertains when they should again recur, and contents himself with enforcing the constitutional treatment until about six days before the calculated time. Then he lays aside the other medicines, and has recourse to those means which determine to the uterus. Two leeches are applied to the inside of the thigh, near the labium, every second night, until they have been three times applied.* The bleeding is encouraged by stuping. On the intermediate days the bowels must be actively moved by aloetic pills; and for three nights before and after the molimina, hot pediluvia, rendered stimulating by mustard seed, may be used. During the same time also friction, with stimulating liniments, should be applied to the feet and legs every morning, and oil of turpentine or tincture of cantharides may be exhibited internally, while the necessity of more active exercise is inculcated. If these means fail, they must for a moment be laid aside, and the constitutional treatment must be again resumed until the same number of days before the next period, when the list of remedies above spoken of must be again tried, and in few cases indeed shall we find them to fail."—Graves' *Clinical Lectures.*

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* I have never found it necessary to have recourse to bleeding.

SQUILL.

Squill has a bitter taste. It acts powerfully on the stomach and intestines in full doses, exciting great nausea and vomiting, with frequent watery and even bloody diarrhœa. Similar symptoms are likewise produced when the drug is injected into the cellular tissue or peritoneal cavity.

Squill is never used as an emetic or purgative, but almost exclusively as an expectorant in bronchitis.

Some extol it as a diuretic. It is recommended in all forms of dropsy.

JALAP. SCAMMONY.

Buchheim asserts that these two substances are rendered purgative only by combining with the bile; unmixed with this secretion, they are inert. They are easily soluble in the bile, and probably undergo decomposition, but the products are unknown. Taurin and glycocoll exert no influence on their efficacy, but it is otherwise with tauro-cholate and glyco-cholate of soda; hence Buchheim concludes that the activity of these drugs is determined by the soda of the bile. They excite diarrhœa of watery motions, with some colic and occasional vomiting, and their use is often followed by much constipation.

These medicines are used as purgatives in obstinate constipation, and jalap, in combination with other substances, is employed in dropsies. Scammony is frequently used with much advantage to destroy the small thread-worms infesting the rectum.

Dr. Rutherford finds that scammony given to fasting dogs, is a feeble cholagogue even when it purges.

Bleeding has recently been employed with great success in engorgement of the right side of the heart from emphysema and bronchitis, mitral obstructive or regurgitant disease. Now, for some years I have employed purgatives in these cases, with considerable benefit, to produce three or four watery motions, and I venture to say that this treatment, first employed by Dr. Graves, saves many lives.

Like bleeding, free purging unloads the distended and therefore weakened right heart, and it moreover produces a very favourable change in the character of the expectoration, rendering its expulsion easier. The following case, one among many similarly benefited by free purging, will illustrate the advantages of this plan.

A woman, about 40 years of age, suffering from emphysema, was seized with severe bronchitis. She had been dangerously ill about a fortnight: her skin was of a deep leaden tint; her eyes were prominent, congested, and suffused; her jugular veins were greatly distended; the surface of her body was covered with a cold, clammy perspiration, profuse on her face; her extremities were deadly cold; her temperature varied between 97° and 98° Fah. She suffered from slight delirium both night and day. Her breathing was hurried, and her chest expanded only slightly; expectoration was abundant, viscid, airless, and purulent; pulse large, but very compressible, varied from 96 to 100 beats in the minute. The respiratory sounds were obscured by an abundance of mucous rhonchus, and physical examination showed that the right side of her heart was greatly distended. Her urine contained a trace of albumen; her legs were not œdematous. So dangerously ill was she that death appeared imminent. After free purgation with jalap and bitartrate of potash, in a few hours the jugular veins became much less distended, and next day they were of natural size; while the deep leaden tint of her skin had given place to a diffused bright red colour often witnessed in cases treated in this way; this colour being probably due to the capillaries—previously distended by the obstructed circulation, till being weakened they lose their power to contract—becoming filled with arterial instead of venous blood. This bright red colour was most marked over the face and hands; her skin became warm, though she continued to perspire freely, and her hands easily grew cold on exposure. She expressed herself much relieved. In twenty-four hours the expectoration became slightly aërated, this change being much more marked on the following day, when the expectoration was observed to be less purulent, and to contain much mucus. On the third day the expectoration was frothy, and consisted chiefly of mucus; coincidently with this improvement in the sputa, her chest expanded more perfectly and the rhonchus diminished. From this time she steadily improved, and was discharged cured.

The engorgement of the right heart with general venous congestion is no doubt apt to return, when it becomes again necessary to purge; indeed, several purgings may be required. It will rarely happen, I believe, that the venous congestion cannot be removed temporarily by this treatment.

The change in the expectoration sometimes takes place more slowly than in the foregoing case, a week elapsing before it becomes frothy and composed of mucus. Any tendency of the expectoration to assume its old characters may be prevented by a repetition of the aperient.

Sometimes these patients complain of very severe dull headache, or of dull oppressive pain at the epigastrium; bleeding or purging relieve both symptoms, bleeding giving instant ease.

In persistent tricuspid regurgitation from permanent distension of the right side of the heart, induced by repeated attacks of bronchitis, purgatives will probably be of no use except when an attack of bronchitis, adding to the obstruction of the pulmonary circulation, increases the dilatation.

RHUBARB.

RHUBARB is a purgative, and is said to be likewise a tonic. After purging it constipates, on which account it is often used in the early stages of diarrhœa, to get rid of any irritating matters from the intestines, and after their expulsion to check the diarrhœa. It is a very useful purgative for children, especially when mixed with two or three times its weight of bicarbonate of soda.

Röhrig finds that rhubarb given to fasting dogs greatly increases all the constituents of the bile, though the rhubarb either failed to purge or purged very slightly; and Rutherford verifies this observation.

Dr. Stillé, on the authority of Dr. S. Jackson, (U. S.), whose testimony he endorses, speaks of rhubarb as a remedy of surprising efficacy in piles, when laxatives are needed. He directs a piece weighing about ten grains to be chewed, or rather slowly dissolved in the mouth nightly, or less frequently, according to the degree of constipation, estimating that rhubarb taken in this fashion is fivefold more efficacious than the powder. He also recommends it in the costiveness and hæmorrhoidal swellings incident to pregnancy. (Stillé's *Therapeutics*).

Rhubarb generally colours the urine reddish yellow, which, on the addition of ammonia and other alkalies, changes into a purple red. It colours also the sweat, the serum of the blood, and the milk; and it makes the milk bitter and purgative.

It may be usefully blended with some tonic.

SENNA.

Senna is an active purgative, promoting both secretion and peristaltic action. It often produces nausea and griping. It may be usefully combined with a bitter tonic, as in the mistura gentianæ composita of former pharmacopœias. This mixture is very useful in dyspepsia with constipation and contains an ounce of compound infusion of gentian to half an ounce of compound infusion of senna.

Senna renders a mother's milk purgative, and may produce colic in the child.

Röhrig and Rutherford find that in fasting dogs senna slightly increases the secretion of bile.

SENEGA.

Senega promotes the secretion of the bronchial mucous membrane, and probably that of the other mucous membranes. It produces a burning itching sensation in the mouth and throat.

It is used in chronic bronchitis, especially in the case of aged people, in whom this disease is usually complicated with emphysema. Some give it in croup and whooping-cough. It is also reputed to be diuretic, and is used when the deficiency of urine is due to kidney disease. "Infusion of senega (four to six drachms infused in six to twelve ounces of water, and taken during the day) produced no effect on the urine in Böker's experiments, conducted on himself and on a pregnant woman."—(Parkes *on Urine*).

ANTHELMINTICS—

- FILIX MAS.
- KOUSSO.
- KAMELA.
- SANTONIN.
- TURPENTINE.
- ARECA NUT.
- BARK OF THE POMEGRANATE ROOT.
- POWDERED TIN.
- MUCUNA, ETC.

THE intestines are infested by worms of various kinds. The common kinds are the flat worms. (Tænia solium and Bothriocephalus latus), round worms (Ascaria lumbricoides), and thread worms (Ascaria vermicularis).

Worms may be treated in three ways. Drugs, as powdered tin and mucuna, may be employed to kill the worm by their mechanical action; or powerful purgatives may be used simply to expel the worm, as jalap, scammony, etc.; or true vermicides, having very little effect on the tissues of the human body, to poison and kill the worm. With the exception of powdered tin and mucuna, all the medicines comprised in the foregoing group are vermicides. It must, however, be borne in mind that all are not equally efficacious against every kind of worm, for some are poisonous to one kind, and harmless to another; success, in fact, depends not only on giving the fitting drug, but giving it in the right way. These medicines should reach the worms in as concentrated a state as possible; but if the stomach and intestines are filled with food, the poison being thus diluted, may fail to destroy the worms. It is proper, therefore, to give over-night a purgative, and to direct the patient to take a very light tea and no supper, and on the following morning, after the purgative action, to give the anthelmintic.

FILIX MAS is employed for tape-worm. Kuchenmeister asserts that it is more poisonous to the bothriocephalus than to the tænia. The patient should eat a very light tea, no supper, and, just before bedtime, swallow a dose of castor oil, a purgative to be preferred to others on account of its speedy action. On the following morning, about six or seven o'clock, when the oil will generally have acted, give the liquid extract of male fern in a dose varying from ten drops to a drachm, according to age. The patient is then to abstain from food till the bowels have been freely relieved, when in most cases the worm will be expelled. Some recommend a brisk purge to follow the anthelmintic; but this is seldom necessary, as the foregoing simple plan rarely fails to dislodge the worm. Too large a dose of the male fern may cause nausea, sickness, and even colic, effects seldom witnessed with a moderate dose. The liquid extract of male fern is slightly purgative, and for this reason it is not always necessary to administer a purgative after it. The worm should be carefully examined, in order to ascertain if the head has been expelled; in that case there is no fear of the regrowth of the worm. It has, however, been ascertained, that if only the head and a small piece of the neck are left, the worm will die; so that if the head cannot be discovered, it must not be concluded that the patient is not permanently freed of the worm. If any piece is found which tapers to a fine point, even if the head is not attached, it may reasonably be hoped that the worm is destroyed. A good plan to obtain for examination all the expelled worm is to shake up the motions, already watery and loose from the purgative, with some water, and to filter the whole through a piece of coarse muslin, by which means, the head, even if separated from the trunk, may be detected and examined.

Male fern is generally considered the fittest treatment for the flat worm.

Kousso is used for tape-worms of all kinds, and appears to be very successful, although not much employed in this country. In Abyssinia, where tape-worm is extremely common, kousso has been in use upwards of two centuries. The dose is half an ounce of the flowers suspended in water, and taken after a short fast, as in the previous case. Kuchenmeister asserts that kousso liver oil and iron preparations soon restore the gastro-intestina canal to a healthy condition.

Oils, as is well known, are reputed to be vermicides.

If the foregoing remedies fail, other medicines must be employed to remove the catarrhal state of the mucous membran as common salt, chloride of ammonium, and antimony salt Cold-sponging, out-door exercise, with a judicious diet, aid improving the general health.

DIETARY FOR INVALIDS.

1. Macaroni Soup.

One ounce and a half of macaroni, a piece of butter the size of a nut; salt to taste, one quart of stock.

Throw the macaroni and butter into boiling water, with a pinch of salt, and boil twenty-four minutes. When tender, drain, and cut into thin rings or lengths, and drop it into the boiling soup. Stew gently fifteen minutes, and serve.

2. Barley Soup.

One pound of shin of beef, four ounces of pearl barley, one potato, salt and pepper to taste, one quart and a half of water.

Put all the ingredients into a pan, and simmer gently for four hours. Strain, return the barley, and heat up as much as required. A small onion may be added, if not objected to.

3. Bread Soup.

One pound of bread, two ounces of butter, one quart of stock.

Boil the bread with the butter in stock. Beat the whole with a spoon or fork, and keep it boiling till the bread and stock are thoroughly mixed. Strain, season, and serve.

4. Tapioca Soup.

Two ounces and a half of tapioca, one quart of stock.

Put the tapioca into *cold* stock, and bring it gradually to the boiling point. Simmer gently till tender, and serve.

5. Sardinian Soup.

Two eggs, a quarter of a pint of cream, one ounce of fresh butter, salt and pepper to taste, a little flour to thicken.

Beat the eggs, put them into a stewpan, and add the cream, butter and seasoning, stir in as much flour as will bring it to the consistency of dough, make it into balls the size and shape of a nut, fry in butter, and put them into a basin of any sort of soup or broth, to which they make a very nice addition.

6. Restorative Beef Essence, 1.

Take one pound of fresh beef, free from fat, chop it up fine, and pour over it eight ounces of soft water, add five or six drops of hydrochloric acid, and fifty or sixty grains of common salt, stir it well, and leave it for three hours in a cool place. Then pass the fluid through a hair sieve, pressing the meat slightly, and adding gradually towards the end of the straining about two more ounces of water. The liquid thus obtained is of a red colour, possessing the taste of soup. It should be taken cold a tea-cupful at a time. If preferred warm, it must not be put on the fire, but heated in a covered vessel placed in hot water.

Should it be undesirable for the patient to take the acid, this soup may be made by merely soaking the minced beef in distilled water.

20. *Sago Soup,*

An ounce and a half of sago, one pint of stock.

Wash the sago. Put one pint of stock on the fire, and bring it to the boil; add the sago, and simmer till it is entirely dissolved. When cold, it will form a jelly.

21. *Rice Soup.*

Three ounces of Patna rice, the yolks of two eggs, half a pint of cream or ne milk, one quart of stock.

Boil the rice in the stock, and rub half of it through a tammy, put the stoc in a stewpan, add the rest of the rice whole, and simmer gently for five minute Have ready the cream or milk, boiled. Beat the yolk of the eggs, and mix the gradually with the cream. Take the soup off the fire, add the cream and egg stirring them well together as you mix them. Heat it up gradually, but *do n let it boil*, or the eggs will curdle, and the soup be spoilt.

22. *Semolina Soup.*

Drop an ounce of semolina into one pint of boiling stock, and stir constantl to prevent burning. Simmer gently for half an hour. Season with salt to tast

23. *Raw Meat Diet.*

Two ounces of rumpsteak, taking away all fat, cut into small squares, withou entirely separating the meat, place in a mortar and pound for five or ten minutes, then add three or four table-spoonfuls of water, and pound again for short-time, afterwards taking away all sinew or fibre of the meat, leaving onl the creamy substance, add salt to taste. Before using, place the cup or ja containing the pounded meat in hot water until just warm.

Or, scrape the beafsteak with a sharp knife, and after removing all the fat an tendon, if not already in a complete pulp pound it in a mortar. This may b taken in the form of sandwich between thin bread and butter, or mixed wit water to the consistence of cream.

This diet is excellent for children with diarrhœa, also for adults who suffe from irritable bowels or chronic diarrhœa.

24. *Beef Tea and Cream Enema.*

Mix four or five ounces of strong beef tea, one ounce of cream, and half a ounce of brandy or one ounce of port wine.

25. *Stewed Eels.*

One eel, half a pint of strong stock, two table spoonfuls of cream, half a glas of port wine, thickening of flour, a little cayenne.

Wash and skin the eel, cut it in pieces about two inches long; pepper an salt them, lay them in a stewpan, pour the stock over, and add the wine. Ste gently for twenty-five minutes or half an hour, lift the pieces carefully on to very hot dish, and place it by the fire, strain the gravy, stir into the cream sufficient flour to thicken it, mix with the gravy, boil for two minutes, and add little cayenne. Pour over the eels and serve. Sometimes the addition of a littl lemon-juice is agreeable.

26. Stewed Oysters.

Half a pint of oysters, half an ounce of butter, flour, one-third of a pint of cream, cayenne and salt to taste.

Scald the oysters in their own liquor, take them out, beard them, and strain the liquor. Put the butter into a stewpan, dredge in sufficient flour to dry it up, add the oyster liquor, and stirr it over a sharp fire with a wooden spoon. When it boils, add the cream, oysters, and seasoning, and simmer for one or two minutes, but *not longer*, or the oysters will harden, serve on a hot dish, with croutons or toasted sippets of bread. A quarter of a pint of oysters, the other ingredients being in proportion, make a dish large enough for one person.

27. Macaroni.

Two ounces of macaroni, a quarter of a pint of milk, a quarter of a pint of good beef gravy, the yolk of one egg, two table-spoonfuls of cream, half an ounce of butter. Wash the macaroni, and boil it in the gravy and milk till *quite* tender. Drain it, put the macaroni into a very hot dish, and place it by the fire. Beat the yolk of the egg with the cream and two table-spoonfuls of the liquor the macaroni was boiled in. Make this sufficiently hot to thicken, *but do not allow it to boil*, or it will be spoiled; pour it over the macaroni, and strew over the whole a little finely grated Parmesan cheese; or the macaroni may be served as an accompaniment to minced beef, without the cheese; or it may be taken alone, with some good gravy in a tureen, served with it.

28. Minced Fowl and Egg.

Cold roast fowl, a hard-boiled egg, salt, pepper, or cayenne, to taste; three table-spoonfuls of new milk or cream, half an ounce of butter, one table-spoonful of flour, a tea-spoonful of lemon-juice.

Mince the fowl, and remove all skin and bones; put the bones, skin, and trimmings into a stewpan, with one small onion, if agreeable, and nearly half a pint of water; let this stew for an hour, then strain the liquor, chop the egg small, mix with the fowl, add salt and pepper, put in the gravy and other ingredients, let the whole just boil, and serve with sippets of toasted bread.

29. Fowl and Rice.

A quarter of a pound of rice, one pint of stock or broth, one ounce and a half of butter, minced fowl, egg, and bread-crumbs.

Put the rice into the cold stock or broth, let it boil very gently for half an hour, then add the butter, and simmer it till quite dry and soft. When cold, make it into balls, hollow out the inside and fill them with mince made according to the foregoing receipt, but a little stiffer; cover with rice, dip the balls into egg, sprinkle with bread crumbs, and fry a nice brown; a little cream stirred into the rice before it cools improves it very much.

30. Chicken and Rice.

Cut up the meat of boiled chicken. Have ready some rice well cooked and seasoned with salt, put round a small flat dish or vegetable dish, warm up the chicken in a little good gravy, and serve in the middle of the dish with the rice round it.

31. *Panada.*

Take the crumb of a penny roll, and soak it in milk for half an ho squeeze the milk from it; have ready an equal quantity of chicken *scraped* very fine with a knife; pound the bread-crumbs and meat toget mortar. It may be cooked either mixed with veal or chicken broth, or like an egg, by taking it up in two spoons, in pieces the shape of an e seasoning it and served on mashed potato.

32. *Macaroni boiled in Milk.*

One ounce of macaroni, three-quarters of a pint of new milk, a littl rind, a little white sugar.

Put the milk into a saucepan with the lemon-rind, bring it to boilin and drop in the macaroni. Let it swell gradually over the fire till *qui* but do not allow the pipes to break.

33. *Rice Cream, 1.*

To a pint of new milk add a quarter of a pound of ground rice, a butter the size of a walnut, a little lemon-peel, and a table-spoonful dered sugar. Boil them together for five minutes, then add half an isinglass which has been dissolved, and let the mixture cool. When half a pint of good cream whisked to a froth, mix altogether, and set time in a very cool place, or on ice; when used, turn it out of the basi dish, and pour fruit juice round it, or some stewed apple or pear may with it.

34. *Rice Cream, 2.*

A quarter of a pound of whole rice, well stewed in milk, and put in a drain and cool, mix with the rice a gill of good cream whisked to a fr add a wine-glass of sherry, a little powdered sugar, and a tea-spoonful juice.

35. *Light Pudding.*

Boil very smoothly in new milk one table-spoonful of ground rice, l *quite cold*, then add two eggs, very well beaten up, a lump of white su if liked, a dessert-spoonful of brandy. Line a small tart dish (sufficien person) with paste, put in the pudding, and bake quickly. Serve the m is ready, for it falls directly.

36. *Rice and Apple.*

Boil about two table-spoonfuls of rice in a pint and a half of new m simmer, stirring it from time to time, till the rice is *quite* tender. Ha some apples, peeled, cored, and stewed to a pulp, and sweetened wit little loaf sugar. Put the rice round a plate, and the apple in the mi serve.

37. *Milk for Puddings or Stewed Fruit.*

Boil a strip of lemon and two cloves in a pint of milk; mix half a tea- of arrowroot in a little cold milk, and add it to the boiling milk; st about the consistency of cream. Have ready the yolks of three eggs, b well in a little milk. Take the hot milk off the fire, and as it cools add and a table-spoonful of orange-flower water, stirring it constantly till q Keep it in a very cool place till required for use.

38. *Cream for Stewed Fruit.*

An ounce of isinglass boiled over a slow fire in a pint and a half of water, to half a pint. Strain and sweeten, add a glass of sherry, and stir in half a pint of good cream; stir till cold.

39. *Baked Custard Pudding.*

Warm half a pint of milk, or a little more; whisk two eggs, yolks and whites: pour the milk to them, stirring all the while. Have ready a small tart dish, lined at the edges with paste. Pour the custard into the dish, grate a little nutmeg over the top, and bake it in a very slow oven for half an hour.

40. *Boiled Custard Pudding.*

Prepare the custard as in the foregoing receipt. Butter a small basin that will exactly hold it, put in the custard, and tie a floured cloth over it; plunge it into boiling water, float it about for a few minutes, boil it slowly for half an hour, turn it out and serve.

41. *Baked Bread Pudding.*

Half a pint of new milk, a quarter of a pound of bread-crumbs, two eggs, one ounce of butter, sugar to taste.

Boil the milk, and pour it over the bread crumbs, and let them soak for half an hour. Beat the eggs, mix them with the bread crumbs, add the sugar and butter, and stir well till thoroughly mixed. Butter a breakfast cup or small pudding mould, fill it a little more than half full with the mixture, and bake in a moderate oven for about twenty minutes.

42. *Semolina Pudding.*

One ounce of semilona, half a pint of milk, one ounce of butter, two eggs, sugar to taste.

Heat the milk, and mix with it the semolina, sugar, and butter; stir this over the fire for a few minutes; then take it off, and mix with it the eggs, which should be well beaten. Butter a small tart dish, line it with puff paste, put in the pudding, and bake in a slow oven.

43. *Rice Pudding.*

One ounce of whole rice, three-quarters of a pint of milk, half an ounce of butter, one egg, sugar to taste.

Let the rice swell in the milk over a slow fire, stir in the butter, and then let the mixture cool. Well beat the egg, and mix with the rice. Butter a breakfast-cup or small mould, fill it three parts full, and bake. Turn it out and serve.

44. *Tapioca Pudding.*

One ounce of tapioca, one pint of milk, one ounce of butter, one egg, sugar to taste.

Wash the tapioca, and let it stew gently in the milk for a quarter of an hour, stirring it now and then. Let it cool. Mix with it the butter, sugar, and eggs which must be well beaten; put it into a small tart dish. Bake in a moderate oven.

45. *Apple and Rice.*

Take three small apples, peel and halve them, take out the cores, put them into a stewpan with about half an ounce of butter, and strew over them a little white sifted sugar. Stew them very gently till tender, taking care not to break them. Boil the rice with the milk and a little sugar till quite soft; and when done, dish it with the apples on the top of it and a little cream served with it separately.

46. *Vermicelli Pudding.*

Two ounces of vermicelli, three-quarters of a pint of milk, quarter of a pint of cream, one ounce and a half of butter, two eggs, one ounce and a half of sugar.

Boil the vermicelli in the milk till it is tender, then stir in the remaining ingredients. Butter a small tart dish, line with puff paste, put in the pudding, and bake.

47. *Rice Milk.*

Three table-spoonfuls of rice, one quart of milk.

Wash the rice, put it into a saucepan with the milk, and simmer gently till the rice is tender, stirring it now and then to prevent the milk burning. Sweeten a little, and serve with a cut lemon, black-currant jam, or apples stewed.

48. *Milk Blancmange.*

A quarter of a pound of loaf sugar, one quart of milk, one ounce of isinglass.

Put all the ingredients into a lined saucepan, and boil gently till the isinglass is dissolved. Keep stirring it over the fire for about ten minutes. Strain it through a fine sieve into a jug, and when nearly cold pour it into an oiled mould. Turn it carefully out when required for use.

49. *Junket.*

To a pint of milk heated till it is lukewarm add a teaspoonful of concentrated essence of rennet and a small tea-spoonful of pounded white sugar; pour it into a bowl or mould, cover with a napkin, put it aside to cool, when it is ready for use.

Concentrated essence of rennet can be bought at all grocers.

50. *Rice Blancmange.*

A quarter of a pound of ground rice, two ounces of loaf sugar, one ounce of butter, one quart of milk, flavouring of lemon-peel.

Mix the rice to a smooth batter with a little milk, and put the remainder into a saucepan with the butter, sugar and lemon-peel. Bring the milk to boiling point, stir in the rice. Let it boil for ten minutes, or till it comes away from the saucepan. Grease a mould with salad oil, pour in the rice, let it get perfectly cold, and turn out.

51. *Arrowroot Blancmange.*

Two table-spoonfuls of arrowroot, three-quarters of a pint of milk, lemon and sugar to taste.

Mix the arrowroot with a little milk to a smooth batter; put the rest of the milk on the fire, and let it boil, sweeten and flavour it, stirring all the time, till it thickens sufficiently to come from the saucepan. Put it into a mould till quite cold.

52. *Fruit Cream.*

Apples, gooseberries, rhubarb, or any fresh fruit.

To every pint of pulp add one pint of milk or cream, sugar to taste. Prepare the fruit as for stewing, put it into a jar with two table-spoonfuls of water, and a little good moist sugar. Set this jar in a saucepan of boiling water, and let it boil till the fruit is soft enough to mash. When cooked enough, beat it to a pulp, work this pulp through a colander, and to every pint stir in a pint of milk or cream. Of course the cream is best if obtainable. Sweeten and serve.

53. *Bread Jelly.*

Take the crumb of a loaf, break it up, pour boiling water over it and leave it to soak for three hours. Then strain off the water and add fresh; place the mixture on the fire, and let it boil till it is perfectly smooth; take it out, and, after pressing out the water, flavour with anything agreeable; put it into a mould, and turn it out when required for use.

54. *Milk Porridge.*

Put a quart of milk into an enamel-lined saucepan. When on the point of boiling scatter in by degrees half a pound of coarse oatmeal. Stir until the mixture thickens; when thickened let it continue to boil about twenty minutes. The porridge can be made thick or thin according to taste. It can be eaten as it is, or with the addition of salt, sugar, treacle, &c.

55. *A Gruel.*

Beat up an egg to a froth, add a wine-glass of sherry, flavour with a lump of sugar, a strip of lemon-peel, and a little grated nutmeg. Have ready some gruel, very smooth and hot, stir in the wine and egg, and serve with sippets of crisp toast. Arrowroot may be made in the same way.

56. *Milk, Egg, and Brandy.*

Scald some new milk, *but do not let it boil.* It ought to be put into a jug, and the jug should stand in boiling water. When the surface looks filmy, it is sufficiently done, and should be put away in a cool place, in the same vessel. When quite cold, beat up a fresh egg with a fork in a tumbler, with a lump of sugar; beat quite to a froth, add a dessert-spoonful of brandy, and fill up the tumbler with scalded milk.

57. *Egg, and Wine.*

One egg, half a glass of cold water, one glass of sherry, sugar, and a very little grated nutmeg.

Beat the egg to a froth with a table-spoonful of cold water. Make the wine and water hot, *but not boiling;* pour it on the egg, stirring all the time. Add sufficient sugar to sweeten, and a very little nutmeg. Put all into a lined saucepan, on a gentle fire, and stir it *one way* till it thickens, *but do not let it boil.* Serve in a glass with crisp biscuits or sippets of toast.

58. *Milk, Rum, and Isinglass.*

Dissolve in a little hot water over the fire a pinch of the best isinglass; let it cool, and mix a dessert-spoonful of rum with it in a tumbler, and fill up the glass with new milk.

59. *Sherry or Brandy and Milk.*

To one table-spoonful of brandy, or one wine-glassful of sherry, in a bowl or cup, add powdered sugar and a very little nutmeg to taste. Warm a breakfast-cupful of new milk, and pour it into a spouted jug; pour the contents from a height over the wine, sugar, &c. *The milk must not boil.*

60. *Egg and Sherry.*

Beat up an egg with a fork till it froths, add a lump of sugar and two table-spoonfuls of water; mix well, pour in a wine-glassful of sherry, and serve before it gets flat. Half the quantity of brandy may be used instead of sherry.

61. *Demulcent Drink.*

Take a pinch of isinglass, and boil it in half a pint of new milk, with half a dozen bruised sweet almonds and three lumps of sugar.

62. *Milk and Isinglass.*

Dissolve a little isinglass in water, mix it well with half a pint of milk, then boil the milk, and serve with or without sugar, as preferred.

63. *Milk and Cinnamon Drinks.*

Boil in one pint of new milk sufficient cinnamon to flavour it pleasantly, and sweeten with white sugar. This may be taken cold with a tea-spoonful of brandy, and is very good in cases of diarrhœa. Children may take it milk-warm without the brandy.

64. *Nutritious Coffee.*

Dissolve a little isinglass in water, then put half an ounce of freshly ground coffee into a saucepan with one pint of new milk, which should be nearly boiling before the coffee is added, boil both together for three minutes; clear it by pouring some of it into a cup and dashing it back again, add the isinglass, and leave it to settle on the hob for a few minutes. Beat up an egg in a breakfast cup, and pour the coffee upon it; if preferred drink it without the egg.

65. *Arrowroot Drink.*

Mix two tea-spoonfuls of arrowroot in about three table-spoonfuls of cold water, then pour in about half a pint of boiling water; when well mixed, add by degrees, half a pint of cold water, stirring all the time, so as to make it perfectly smooth; it should be about the consistence of cream; if too thick, a little more water may be added. Then pour in two wine-glassfuls of sherry or one of brandy, add sugar to tasto, and give it to the patient in a tumbler. A lump of ice may be added if allowed.

66. *Mulled Wine.*

Boil some spice, cloves, nutmeg, cinnamon, or mace, in a little water, just to flavour the wine; then add a wine-glass of sherry or any other wine, and some sugar, bring it to boiling point, and serve with sippets of toast. If claret is used, it will require more sugar. The vessel for boiling the wine should be scrupulously clean.

67. *To keep Milk from turning sour.*

Fifteen grains of bicarbonate of soda to a quart of milk hinders its turning sour.

68. *Barley Water.*

To a table-spoonful of pearl barley, washed in cold water, add two or three lumps of sugar, the rind of one lemon, and the juice of half a lemon. On these pour a quart of boiling water, and let the the mixture stand for seven or eight hours. Strain it. The barley should never be used a second time. Half an ounce of isinglass may be boiled in the water.

69. *Lemonade, 1.*

Well rub two or three lumps of sugar on the rind of a lemon, squeeze out the juice, and add to it half a pint or a pint of cold or iced water, or better still, a bottle of soda-water.

70. *Effervescing Lemonade, 2.*

Squeeze two large lemons, and add a pint of spring water to the juice, and three or four lumps of white sugar. When required for use, pour half of it into a tumbler, and add half a small teaspoonful of carbonate of soda; stir, and drink whilst effervescing.

71. *Lemonade, 3.*

The juice of four lemons, the rinds of two, half a pint of sherry, four eggs, six ounces of loaf sugar, one pint and a half of boiling water.

Pare the lemon-rind thinly, put it into a jug with the sugar, and pour the boiling water on it. Let it cool, and then strain it, and add the wine, lemon-juice, and eggs, previously well beaten and strained. Mix all well together, and it is ready for use.

72. *Lemonade, 4.*

Pare the rind of three lemons as thin as possible, add one quart of boiling water, and a quarter of an ounce of isinglass. Let them stand till next day covered, then squeeze the juice of eight lemons upon half a pound of lump sugar; when the sugar is dissolved, pour the lemon and water upon it, mix all well together, strain it, and it is ready for use.

73. *Arrowroot and Black-Currant Drink.*

Take two large spoonfuls of black-currant preserve, boil it in a quart of water cover it, and stew gently for half an hour, then strain it, and set the liquor again on the fire; then mix a tea-spoonful of arrowroot in cold water, and pour the boiling liquor upon it, stirring meanwhile; then let it get quite cold, and strain.

74. *White Wine Whey.*

To half a pint of boiling milk add one or two wine-glassfuls of sherry; strain through a fine sieve, sweeten with sifted sugar, and serve.

75. *Caudle.*

Beat up an egg to a froth, add a wine-glassful of sherry, and half a pint of gruel, flavour with lemon-peel and nutmeg, and sweeten to taste.

76. *Another Caudle.*

Mix well together one pint of cold gruel with a wine-glassful of good cream, add a wine-glassful of sherry and a table-spoonful of noyeau, and sweeten with sugar-candy.

77. *Egg and Brandy.*

Beat up three eggs to a froth in four ounces of cold spring water, add two or three lumps of sugar, and pour in four ounces of brandy, stirring all the time. A portion of this may be given at a time.

78. *Sour Milk Diet.*

The milk for this food must be good. It must be allowed to stand for forty-eight hours in a cool cellar; the vessel in which it is kept being upright, as a gallon measure. The milk becomes solid, and looks like poor blancmange. It carries a cream on the top, which most people remove as it makes it too rich. To about a pint of this sour milk, or rather less, add half a pound of greated rye bread, a good deal of powdered sugar, and a glass of sweet milk, well stirred together.—*Hints to the Sick.*

79. *Oatmeal Porridge.*

Oatmeal three or four ounces. Water one pint. Boil the water and add a little salt, about one sixteenth of an ounce. Sprinkle in the meal very gradually and carefully, till of a sufficient consistency. Stir it well all the time with a porridge stick (which should be an inch broad at the bottom). Boil gently for fifteen or twenty minutes, add a little more boiling water and boil it five minutes longer, this makes it smooth. Pour it on plates and serve. The usual way is to make a hole in the middle with a spoon, add a piece of butter the size of a nutmeg, and upon it a spoonfull of coarse brown sugar, eat it from the circumference and dip each spoonfull into the butter and sugar.

80. *Burgout.*

A pint of water gradually added to eight ounces of oatmeal. The whole made quite smooth, and then boiled a quarter of an hour. Butter, salt, pepper to taste. Indian meal may be used instead of oatmeal if preferred.

81. *Port Wine Jelly.*

Put into a jar 1 pint of port wine, 2 oz. of gum arabic, 2 oz. of isinglass, 2 oz. of powdered white sugar candy, a quarter of a nutmeg grated fine, and a small piece of cinnamon. Let this stand closely covered all night. The next day put the jar into boiling water and let it simmer till all is dissolved, then strain it, let it stand till cold, and then cut it up into small pieces for use.

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,, Valerianate 737

INDEX TO DISEASES.

ABSCESS.

Belladonna, 506. Internally; often successful.
Carbolic acid, 36 and 309 A weak solution as injection after evacuation. For Lister's antiseptic method, see p. 309.
Caustic alkalies, 153. For opening abscesses, for precautions, see ref.
Counter-irritation, 106. By blisters or iodine around or adjacent to the disease.
Ether, 342. As spray to produce local anæsthesia for opening abscesses.
Iodine, 107. Solution or tinct. injected into cavities of large abscesses after evacuation.
Oleate of mercury and morphia, 227. Locally diminishes induration due to old abscesses and prevents formation of new ones.
Phosphate of lime, 178. In large abscesses.
Poultices, 35. To check formation of pus or to assist in maturation. May be smeared over with belladonna or opium.
Sulphides, 97.

ACIDITY.

Acids, 134. Given shortly before a meal.
——— 140. Hydrochloric or Nitric in small medicinal doses before meals for acidity from whatever cause it arises, especially for acid pyrosis; after meals for alkaline pyrosis.
Alkalies, 156. Only palliative; bicarbonates best; if the escape of carbonic acid is troublesome, substitute magnesia if bowels confined, lime water if relaxed.
Bismuth, 209. The nitrate combined with morphia or opium, and sometimes with magnesia.
Ipecacuanha, 140. In acidity of pregnancy.
Magnesia, 171. The oxide better than the carbonate—only a temporizing remedy—acids far better.
Mercury, 235. Half-a-grain three times a-day when accompanied by clayey stools.
Nux Vomica, 140. Two or three drops just before meals in acidity of pregnancy.

ACNE.

Arsenic, 133. Liq. arsen. given with bromide prevents its causing bromic acne.
Belladonna, 506. Locally of some slight service.
Bromide of potassium, 120.
Hot fomentations, 35.
Hot sponging, 41. For acne indurata.
Iodide of sulphur, 101. An ointment in a. indurata and rosacea, also in bromic acne, 133.
Mercury, 225. In early stages a lotion of corrosive sublimate one part; alcohol enough to dissolve it; water 100 parts. A teaspoonful of this to be added to a quarter of a pint of water and the face sponged with it night and morning.
Soap, 153. With hot water several times a-day. If this irritates, rub in glycerine of starch after each washing.

ACNE—*continued.*

Sulphur, 91. As lotion for young women with disordered menstruation. In severe forms an ointment of hypochlorite or iodide of sulphur.
——— 94. Sulphur may be used internally.

AGUE.

Arsenic, 276. The best remedy except quinine. Especially useful in long standing agues of quartan type.
Cascarilla, 599. Has been used.
Chamomile, 599. Has been used.
Emetics, 251. Many cases may be cured by emetics, and one each morning will assist the action of quinine. Ipecac and other emetics should be preferred to antimony.
Hyposulphite of soda, 148. Fifteen to twenty grains every two hours.
Narcotine, 551. Said by some to be superior to quinine.
Quinia, 576. By far the best remedy we possess for intermittent fevers.

In mild forms small doses several times a-day.

In malignant forms large doses given in a non-febrile period.

The drug should not be discontinued for some time after all symptoms have disappeared.

It is of service as a prophylactic against ague.

It may be administered hypodermically or by the rectum—ether is the best solvent for injection.

Cinchonia, quinidinia and cinchonidinia are all useful in ague but less so than quinia.

Quassia, 598. Has been used
Salicylic acid, 597. As an adjunct to quinia.

ALCOHOLISM. (*See Dipsomania*).

Arsenic, 269. For vomiting.
Morphia, 541. With tonics before meals for pain, nausea and want of appetite.
Phosphorus, 283. In chronic alcoholism.

AMENORRHŒA.

Actea racemosa, 417. Generally, and when menses checked.
Aconite, 429. When menses suddenly checked.
Aloes, 602. At the periods, together with hot pediluvia, friction, stimulating liniments, &c. For general directions see ref.
Chloride of ammonium, 182. For headache.
Cold sponging, 25.
Ergot, 569. Where anæmia—after the use of iron.
Hot sitz bath, 22. For six days before the period. Mustard may be added at the period. Often effectual in sudden suppression,
Iron, 205. To remedy the anæmia.

Amenorrhœa—*continued.*

- **Mustard**, 383. A mustard sitz bath a few days before and during the time the missing discharge is due. A course of these baths assists the restoration of the uterine functions.
- **Savine**, 378. When due to want of tone in uterus.
- **Spinal ice bag**, 46. Applied to lower dorsal and lumbar vertebræ.

Amaurosis. (*See Eye Diseases*).

Anæmia.

- **Acids**, 144. Added to purgative salts as tonic to mucous memb.
- **Cold sponging**, 25.
- **Hypophosphites**, 181. Of lime or soda.
- **Iron**, 200. Some stomachs with irritable mucous memb. require bland preparations. A flabby tongue indicates large doses of astringent preparations as perchloride or sulphate. Weak anæmic girls with pain and vomiting after food require larger doses of the tinct. perchlor., for other formulæ, see p. 203. It is sometimes well to humour the stomach by changing the preparation. Some persons are quite unable to take iron in any form, 204. Iron may be given in anæmia with disturbance of uterine functions, and should be conjoined with nourishing food, pure air, light, and if necessary, purgatives. If the anæmia is due to organic disease iron at best only palliative.
- **Oxygen**, 84
- **Phosphate of lime**, 178. In anæmia of growing persons, and of women weakened by rapid child-bearing or excessive menstruation.
- **Quinia**, 580. For badly fed, pale, town-livers.

Aneurism.

- **Chloroform**, 341. Inhalation if great dyspnœa.
- **Iodide of potassium**, 119. Combined with recumbent position and restricted diet.

Angina Pectoris.

- **Arsenic**, 276. Lessens severity of attacks.
- **Ether**, 343. Or spirits of chloroform in full doses very useful.
- **Morphia**, 537. Hypodermically.
- **Nitrite of amyl**, 360. As inhalation most valuable.
- **Phosphorus**, 282. Often serviceable.

Anthelmintics. (*See "Worms"*).

Anus, pain after operations at.

- **Ice**, 42. Applied in bladder.

Aortic Disease. (*See Heart Diseases*).

Appetite, loss of. (*See Dyspepsia*).

Aphthæ.

- **Alum**, 197. Applied dry a few times a-day to aphthous ulcers which will not heal—generally, however, chlorate of potash and a purgative sufficient.

Aphthæ—*continued.*

- **Borax**, 156. With honey or as glycerine of borax.
- **Chlorate of potash**, 194.
- **Glycerine of borax**, 299.
- **Nitric acid**, 138. In small doses.

Apoplexy.

- **Croton oil**, 297. As purgative one-fourth or one third minim every hour.

Ascites.

- **Copaiba**, 376. In all forms of ascites.
- **Elaterium**, 600. Must be given with caution.

Asthma and Quasi-Asthma.

- **Aconite**, 425. Given at commencement of the fever often averts the attack. Useful also in the asthma following coryza and sneezing in children.
- **Alum**, 197. 10 grs. powdered and placed on the tongue said to arrest a paroxysm.
- **Antimony**, 252. In an affection of children like asthma (see ref.), dissolve a grain of tartar-emetic in half-a-pint of water, and give a teaspoonful of this every quarter of an hour for the first hour, then hourly. If vomiting induced lessen the dose.
- **Arsenic**, 257. As cigarettes, caution required (see ref.); also one drop of liq. arsen. three times a-day in attacks of sneezing with coryza, frontal headache and itching of nostrils These attacks may be brought on by cold, by meals, by local irritation, or in children are consequent on bronchitis. These cases are allied to dyspeptic and bronchitic asthma, and to hay fever (see ref.)
- **Assafœtida**, 379.
- **Atropia**, 507. Hypodermically.
- **Belladonna**, 518. Large doses required, but very satisfactory (see ref.)
- **Blisters**, 80. For oppression of breathing especially in bronchitic asthma.
- **Bromide of potassium**, 131.
- **Cannabis indica**, 566. Has been found useful.
- **Carbonic acid gas**, 88. As inhalation.
- **Chamois leather waistcoat**, 30.
- **Chloral**, 350. Often useful in a full dose during a paroxysm.
- **Chlorate of potash**, 191. With nitre to saturate blotting paper, or a pastile may be made of chlorate and nitrate of potash with lycopodium.
- **Chloroform**, 332. Often combined with opium.
- ———— 341. As inhalation if great dyspnœa. A few whiffs will sometimes avert a paroxysm. As liniment rubbed on chest for an hour daily in bronchitic asthma.
- **Coffee**, 570. A small cup of very strong coffee often useful in a paroxysm.
- **Colchicum**, 408. In gouty subjects.
- **Counter-irritation**, 73. See ref. for discussion on.
- **Grindelia Robusta**, 499. Three grs. of extract thrice daily to prevent attacks, or m. xx to m. xxx of liquid extract every half hour or hourly from onset of paroxysm.
- **Iodide of potassium**, 116. In peptic and bronchial asthma
- **Ipecacuanha**, 398. The wine as spray to the fauces, sometimes useful in severe bronchial asthma, but not of much service in genuine asthma—for Dr. Hyde Salter's observations on the general management of asthma, see p. 399.
- **Lobelia**, 562. Ten drops of the simple tincture every ten minutes or quarter of an hour as

Asthma and Quasi-Asthma—*contd.*
soon as signs of a paroxysm appear, till the dyspnœa gives way.
In bronchitic asthma where breathing a little tight all day but much worse at night, ten min. three times a-day with additional doses at night.
This drug must be given cautiously when there is heart disease.
Nitrite of Amyl, 362. As inhalation.
Nitrate of Potash, 190. The inhalation of fumes of burnt nitre paper will sometimes avert a paroxysm. Different methods of preparation useful for different cases, see p. 191.
Opium, 548. In some cases. In others morphia will induce a paroxysm.
Oxygen, 84. When no heart disease.
Silver, Nitrate of, 221. Sometimes injected into trachea, see ref.
Stramonium, 532. Twenty grs. of the dried leaves or ten of the powdered root may be smoked. Datura tatula sometimes better. Stramonium preparations often bad. Asthmatics advised to grow the drug themselves.
Sulphurous Acid, 147. Inhalation, spray or fumigation.
Tobacco, 462. Smoking sometimes gives relief.
Turkish Baths, 30. In bronchial asthma.

Barrenness.
Iodide of Potassium, 116. When due to syphilis.

Bed-sores.
Alcohol, 319. As brandy or eau de Cologne to harden skin of parts exposed to pressure.
Charcoal, 39. Sprinkled over the black slough which is then covered with a poultice.
Glycerine, 299. Or glycerine cream rubbed over part exposed to pressure after washing morning and evening is one of the best preventives of bed-sores.
Iodoform, 344. Dusted over sores.
Silver, Nitrate of, 218. A solution twenty grs. to the oz. to be painted on threatened but unbroken skin as soon as it becomes red to prevent formation of bed-sores.
If nitrous ether solution used, five grs. to the oz. enough.

Bile, Deficiency of.
Mercury, 234. Frequent small doses of grey powder.

Biliary Colic. (*See Colic*).

Bilious Headache. (*See Sick-Headache*).

Bites.
Ammonia, 167. Weak solutions in bites of insects to neutralize the formic acid.

Bleeding. (*See Hæmorrhage*).

Bladder, Diseases of.
Copaiba, 375. Cubebs and buchu in chronic inflammation of bladder and urethra.
Iodoform, 344. As suppository in painful diseases.

Bladder, Diseases of—*continued.*
Sulphites, 148. Internally prevent putrefaction of urine.

Boils.
Belladonna, 98. With glycerine locally to allay pain.
———— 506. Internally often successful.
Camphorated Alcohol, 367. Boils in the earliest stages to be smeared with this for half a minute, then when the skin is dry, it is to be smeared with camphorated oil. A few applications said to disperse the coming boil.
Collodion, 284. Applied at papular or pustular stage. Matter not to be let out except under Lister's plan (see ref.)
Counter-irritation, 82. By blisters or iodine around the boil.
Opium, 538. An extract of the consistence of treacle locally applied three or four times a-day (see ref.).
Poultices, 36. To assist maturation and allay pain, may be smeared over with belladonna or opium.
Silver, Nitrate of, 218. In boils beginning as a papule which maturate into a pustule and inflame and extend till large dead core produced. To be painted on at commencement—collodion, perhaps, better for these.
Sulphides, 98. Hasten maturation and prevent formation of fresh boils. No use in the boils of diabetes.

Bones, Diseases of.
Phosphate of Lime, 178. In caries.
Cod Liver Oil, 291. In strumous disease.

Brain, Diseases of. (*See also Paralysis*).
Bromide of Potassium, 128. When overtasked from study or over application to business.
Phosphorus, 283. In cerebral softening.

Breasts, Inflammation of.
Belladonna, 500. Especially as liniment to check secretion of milk when inflammation imminent. When inflammation has set in, continuous application of belladonna for twenty-four hours often arrests it. It is also useful when an abscess has formed. Fomentations useful in addition, but skin must be dried well before the belladonna is rubbed in.
Digitalis, 458. Infusion locally.

Breath, Foul.
Camphor, 267.

Bright's disease.
Aconite, 427. Should be given immediately on the appearance of inflammation of the kidneys in scarlatina.
Alkalies, 164. Citrates and acetates in acute and chronic Bright's, being reputed to act as diuretics.
Bitartrate of Potash, 187. To prevent dangerous accumulations in cellular tissue or important cavities. Also to draw off effete matters. Care must be used as it is a brisk purgative and so is weakening.
Bromide of Potassium, 124. For convulsions.

BRIGHT'S DISEASE—*continued.*

Cannabis indica, 566. In acute and chronic forms as a diuretic, said to be specially useful where bloody urine.
Cantharides, 380. After subsidence of acute stage, a one min. dose every three hours will stop the hæmaturia.
Cod liver oil, 291. In chronic forms.
Copaiba, 376. Sometimes useful removing dropsy.
Digitalis, 456. Very valuable in some cases; only diuretic as long as dropsy exists.
Elaterium, 600. For the dropsy—caution required.
Iodide of potassium, 116. Possibly only when due to syphilis.
Lead, 216. Diminishes the albumen.
Senega, 607. As a diuretic.
Tannin, 304. In chronic Bright's to lessen albumen.
Tartrates, 187. Excellent diuretics.
Turkish bath, 29.
Warm baths, 20. When uræmic symptoms and dropsy. Discretion needful.

BRONCHITIS.

Aconite, 428. In measles.
Ammonia, 168. Inhalation in chronic bronchitis to lessen over-abundant expectoration.
Ammoniacum, 379. In bronchitis with wheezing and abundant discharge in old people.
Antimony, 252. To shorten acute bronchitis (see inflammation). Also in chronic bronchitis when expectoration copious and difficult to expel.
Arsenic, 274. Where emphysema, with wheezing and not much bronchitis, especially where the wheezing has come on simultaneously with the retrocession of a rash as of eczema; where *much* bronchitis and dyspnœa, belladonna and lobelia better.
Assafœtida, 379. For old people, but ammoniacum generally better.
Balsam of Tolu or Peru, or copaiba, 375. In chronic bronchitis to lessen secretion.
Benzoin, 374. The comp. tinct. one drachm to boiling water as inhalation in chronic bronchitis, eases cough and lessens expectoration.
Carbolic acid, 313. Or creosote, twelve to twenty drops as inhalation with boiling water for abundant expectoration or fœtor.
Carbonic acid gas, 88. As inhalation in chronic bronchitis.
Carbonate of ammonia, 169. When expectoration profuse and patient's strength diminishing, often given with chloride of ammonium which acts similarly, 131, in severe bronchitis or broncho-pneumonia of children, especially when prostrate and livid.
Chamois leather waistcoat, 30. Worn over flannel in bronchial asthma and emphysematous bronchitis.
Chloride of ammonium, 182. In chronic bronchitis when secretion thick and abundant. May be applied by atomizer.
Cod liver oil, 292. To control expectoration in chronic bronchitis.
Colchicum, 408. In gouty subjects.
Counter-irritants, 351. For shortness of breath in bronchitic asthma and bronchitis with emphysema.
Croton oil, 295. With or without liq. potassæ as counter-irritant to chest—caution needful.
Essential oils, 375. Balsam of Peru, tolu and copaiba in chronic bronchitis with copious secretion of pus.
Iodine, 104. The liniment to the chest to lessen cough and expectoration in chronic bronchial

BRONCHITIS—*continued.*

catarrh. As inhalation for children with hoarse, hollow cough after measles, &c. Inhalation sometimes employed in chronic bronchitis.
Ipecacuanha, 388. To produce vomiting in children with much mucus in bronchial tubes.
——— 393-8. As wine, when expectoration is profuse and difficult to expel.
The wine used as spray to the pharynx invaluable in many cases of bronchial asthma and winter cough (see ref.).
Iron, 206. To check profuse bronchial secretion.
Jalap, 604. With bitartrate of potash to free purgation for cases where the right heart is engorged from emphysema, bronchitis, &c.
Lead, 216. To check profuse bronchial secretion.
Lobelia, 563. For paroxysmal dyspnœa.
Mustard, 383. As large poultice with linseed or oatmeal in acute bronchitis, or a tablespoonful added to a bath, very useful in severe bronchitis both of children and adults.
Opiates, 540. Where frequent and violent cough without any signs of obstructed oxidation.
——— 548. To check excessive secretion.
Phosphate of lime, 178.
Poultices, 36. To encircle the whole chest in children.
Quinia, 579. To reduce temperature.
Senega, 607. Especially for the chronic bronchitis of the aged.
Silver, nitrate of, 221. Sometimes injected into trachea (see ref.).
Spinal ice bag, 45. For excessive secretion.
Squill, 604. As an expectorant.
Sulphur, 93. Five to ten grs. in severe chronic bronchitis with abundant discharge, especially where constitutional debility.
Sulphurous acid. 147. Inhalation, spray or fumigation in chronic bronchitis.
Tar, 315. Two grs. in pill every three or four hours in chronic paroxysmal winter cough. Not quite equal to the ipecacuanha spray.
Turkish bath, 30.
Turpentine, 373. Small doses, as a diuretic.
Zinc, oxide of, 249. For profuse bronchial secretion.
—— sulphate of, 247. As emetic; others generally preferred.

BRONCHOCELE. (*See Goitre*).

BRUISES.

Capsicum, 385. A strong tincture applied with gum said to act like a charm on discoloured bruises.
Sulphurous acid, 147. A solution constantly applied.

BUBO.

Iodine, 106. Applied to produce vesication round a bubo relieves the inflammation.
Nitric acid, 136. To indolent and broken bubo.
Peroxide of hydrogen, 85. Applied as in chancre, q. v.
Sulphides, 97. Less useful in maturating than in the case of ordinary boils or abscesses.

BURNS.

Collodion, 283. Painted over slight burns subdues inflammation.
Lime, 172. As lime water and oil.
Warm bath, 21. Immerse for some days.

CALCULI.
Alkalies, 165. To dissolve uric acid calculi (renal or vesical).
Citrate of potash, 159. In large doses for patients with bloody urine containing quantities of uric acid crystals.
Counter-irritants, 80. Relieve pain from passage of renal and biliary calculi.
Nitric acid, 145. Very dilute as injection for phosphatic calculi.

CANCER. (*See also Stomach and Uterus*).
Arsenic, 255. Arsenious acid, pure or with starch as a caustic—enough should be used to set up active inflammation (see ref.).
Carbolic acid, 306. Pure, as anæsthetic before applying caustics.
Carbonic acid, 88. Injected up vagina in cancer of uterus to relieve pain.
Chloral, 351. In ten gr. doses three times a-day, has relieved most severe pain of cancer.
Chloroform, 330. As vapour to raw, painful surface.
Conium, 463. As poultice to ease pain.
——— 469. Internally to relieve pain.
Glycerine of carbolic acid, 299. As application to fœtid cancers on surface or in uterus.
Glycerine of tannin, 304. With glycerine of carbolic acid checks discharge and stench of uterine cancer.
Iodoform, 344. Applied locally relieves the pain of cancerous sores.
Morphia, 540. Dissolved in glycerine and spread on lint, very useful where there is much pain. Opium is also used in cancer of the stomach.
Opium, 535. To cancerous sores.
Poultices, 39. Of starch applied cold.
Warm enemata, 53. To relieve pain and straining in intestinal cancer.

CANCRUM LABIALIS AND ORIS.
Arsenic, 257. In cancrum oris.
Nitric acid, 136. To surface.

CANKERY TASTE.
Mercury, 411. If podophyllin fail.
Podophyllin, 411. When unconnected with alcoholism.
Purgatives, 412. Mercury and podophyllin generally best.
Water, 49. Half a tumbler of pure cold water daily half an hour before breakfast.

CARBUNCLE.
Belladonna, 98. With glycerine as local application to allay pain.
Carbolic acid, 312. Lint soaked in glycerine or oil and carbolic acid to be thrust into discharging sinuses, the whole to be covered over with more lint similarly prepared.
Iodine, 82 and 106. Applied so as to produce vesication round the carbuncle, reduces inflammation.
Opium, 538. An extract of the consistence of treacle applied three or four times a-day (see ref.).
Poultices, 36. The inflamed surface having been previously smeared with belladonna and glycerine.
Strapping, 284. With plaster concentrically from border inwards, will sometimes arrest extension.
Sulphides, 98.

CARDIAC DROPSY. (*See Heart Diseases and Dropsies*).

CARIES.
Phosphate of lime, 178.

CATARRH. (*See also Bronchitis*).
Actæa racemosa, 415. Has been given it is said with much success, when headache, stiffness of muscles and dull aching pain in bones.
Aconite, 423. In catarrh of children and in measles.
Antimony, 253. As tartar-emetic in acute catarrh of children which is often accompanied by vomiting and diarrhœa.
Chlorate of potash, 194. Should be taken early and frequently, eight or ten lozenges in the twenty four hours.
Chloride of ammonium, 182. In chronic catarrh of bronchial and urinary mucous membrane when secretion thick and abundant.
Hot sponging, 22. For headache.
Ipecacuanha, 387. In catarrh of stomach or lungs, especially when secretion from lungs abundant and tenacious.
Lamp, bath, 34.
Opium, 540. Or morphia may be given when there is violent and frequent cough but no signs of obstructed oxidation.
Turkish bath, 30. In chronic catarrh.
Warm foot bath, 22. Before going to bed.

CATCH IN THE BREATH.
Cold sponging, 24. For infants waking with a catch in the breath at night.

CEPHALLAGIA. (*See Headache*).

CHANCRE. (*See Syphilis*).
Caustic alkalies, 150. To hard edges.
Iodoform, 344. Dusted over soft chancres.
Nitric acid, 136. To soft chancres.
Peroxide of hydrogen, 86. Wash three times a day and apply lint soaked in it—said to destroy specific character.

CHANGE OF LIFE.
Actæa, 417. For headache.
Ammonia, 167. As Raspail's sedative lotion to be applied to the painful part of the head in the headaches of this period.
Bromide of potassium, 128. For despondency with sleeplessness and irritability, often also with heats, flushings and perspirations.
Camphor, 368. For drowsiness and headache. Eau de Cologne saturated with camphor to be rubbed into the head.
Change of air and scene, 129. Where other treatment only partially successful.
Iron, 129. For flutterings of the heart.
—— 206. Large doses of sesquichloride three times a-day in fluttering of heart with fulness of head, heat and weight on the vertex, frequent flushings and hot and cold perspirations. If symptoms limited to head and face, nux vomica, opium and belladonna more successful.
Nitrite of amyl, 364. In small doses when the heats predominate.
Valerianate of zinc, 330. For hysterical symptoms.
Warm bath, 21. Once a week.

CHAPS. (*See Nipples, Sore*).

Collodion, 283. Sometimes used, but for chapped hands and lips glycerine of starch, arnica cerate or eau de Cologne and glycerine better; for chapped nipples sulphurous acid and glycerine.
Glycerine, 298. Or, better still, glycerine of starch.
Sulphurous acid, 147. As solution or fumigation.

CHILBLAINS.

Balsam of peru, 374. In ointment for broken chilblains.
Cajeput oil, 374. Locally.
Capsicum, 384. The tincture painted over unbroken chilblains, but this is inferior to iodine. For De Rheims's preparation see ref.
Iodine, 105. Ointment is best.
Sulphurous acid, 147. As solution or fumigation.

CHLOASMA. (*See Pityriasis Versicolor*.

CHEST, PAINS IN, NON-INFLAMMATORY. (*See Myalgia and Pleurodynia*).

Belladonna, 105. When tenderness is in *skin*, pleurodynia.
Iodine, 105. As ointment in *muscular* pains, myalgia.

CHLOROSIS.

Hypophosphites, 181. Of lime or soda.
Iron salts, 204.

CHOKING.

Bromide of potassium, 122. In children who choke with liquids from their birth (see ref.).

CHOLERA AND CHOLERAIC DIARRHŒA.

Arsenic, 270 Has been recommended for the vomiting of cholera and in collapse in the later stages.
Camphor, 368. 4 to 6 drops of the strong spirit of camphor every ten minutes at the commencement till the symptoms abate and hourly afterwards.
An admirable remedy for summer diarrhœa and cholera.
Copper, 245. The salts have been given.
Lead, 212. The acetate has been recommended in early stages.
Mercury, 236. A sixth of a grain of grey powder hourly is of great service in infantile cholera with incessant sickness, profuse almost continuous diarrhœa, offensive and nearly colourless stools. A starch injection with a minute quantity of laudanum assists the grey powder and should be given in urgent cases.
Morphia, 538. One-eighth to one-fourth of a grain hypodermically of the greatest value even in the stage of collapse.
Spinal ice bag, 45, 46. For Cramps.

CHORDEE.

Aconite, 429. In drop doses hourly. Said to remove chordee.
Cantharides, 381. A drop of the tincture three times a day.
Camphor, 369.

CHOREA.

Actæa racemosa, 415. Sometimes succeeds when rheumatic history,—inferior to arsenic.
Antimony, 254. As tartar emetic in increasing doses; other remedies better.
Arsenic, 275. When uncomplicated very successful.
Calabar bean, 477. 3 to 6 grs. of the powder 3 or 4 times a day for children, or 10 to 20 grs. for adults.
Chloral, 349. Sometimes useful. especially where the violent movements render sleep impractible.
Chloroform, 340. Inhalations,—commence with them 3 times a day, often of great service in severe cases.
Cod liver oil, 292.
Cold sponging, 25. Not if rheumatism, fever, or pain in joints. Often well to use water tepid first.
Conium, 468. Apparently only palliative.
Iron, 205. Chorea often relieved or cured by chalybeate waters, generally arsenic is better unless anæmia coexists.
Morphia, 537. Hypodermically when the movements prevent sleep.
Musk, 314. Has been given.
Silver, 222. Both the oxide and nitrate occasionally useful.
Spinal ice bag, 45.
Sulphate of zinc, 248. In large and increasing doses. (See ref.).
Valerian, 378. The preparations are said sometimes to restrain the movements of chorea.
Veratrum viride, 404. Has been employed.

CLAVUS.

Chloride of ammonium, 182.

COLD, FEVERISH.

Turkish bath, 30. At commencement will cut short, also useful later on.

COLD IN HEAD. (*See Coryza.*)

COLDS, TENDENCY TO CATCH.

Cold sponge bath, 30. Supplemented by wet sheet packs, or Turkish bath.

COLDNESS.

Cold water, 29. Cold feet should be immersed in cold water nightly for a few minutes, rubbing them all the time, they should then be dried and warm wollen socks put on.
Spinal ice bag, 45. For cold feet.
Strychnia, 559. For coldness of hands and feet.

COLIC.

Alum, 199. Large doses (10 grs.) every hour given by many in lead colic.
Ammonia, 168. In spasm of of intestinal canal and in colic of children or infants from bad feeding.

COLIC—*continued.*

Belladonna, 509. In colic of intestines, especially of children.

Bromide of potassium, 102. In a peculiar form in young children. (See ref.)

Chloral, 351. Sometimes relieves.

Chloroform, 332, 340. Inhalation in renal and biliary colic, inferior only to morphia injection, superior to opium, warm baths, &c., 2 or 3 administrations may be required.

Counter irritation, 80. For renal and biliary calculi.

Essential oils, 375. Especially of cloves and cinnamon.

Fomentations, 41. In all forms.

Lime water, 174. For young children who eject much of their milk in lumpy masses, some of these lumps passing through the intestines causing colic and wind.

Opium, 542. Or morphia in frequently repeated small doses for colic of intestines. Where, as is usual, there is constipation a purgative should be given.

——— 548. Small doses with spirit of chloroform every 5 or 10 minutes till the pain gives way in renal or biliary colic, or morphia hypodermically.

Spirit of chloroform, 332. In all colics, often combined with opium.

Tobacco, 460. As clyster or by the stomach in colic of intestines

Turpentine, 373. Has been given with advantage in biliary colic.

Warm bath, 21. To ease the pain in biliary, renal or other colic.

COMA.

Bitartrate of potash, 188. As a purgative when blood poisoned.

Blisters, 78. In a comatose condition large blisters or mustard poultices should be applied in quick succession to different parts of the body—chest, abdomen, thighs, and calves—often very valuable in the critical condition near the end of an acute illness.

Cold douche, 27. For stupor of drunkeness or of opium poisoning. May have to be repeated if relapses occur. It should be kept up for a long time if pulse and breathing improve or even become no worse.

Croton oil, 297. As purgative—one quarter or one third min. every hour.

CONDYLOMATA.

Arsenic, 255. Arsenious acid as a caustic. (See ref.)

Mercury, 223. The nitrate locally.

——— 228. Oleate (20 per cent.).

——— 230. Calomel dusted over.

Nitric acid, 99. As a dilute wash constantly applied.

Zinc, 246. Chloride, iodide and nitrate locally.

CONFINEMENT.

Actæa racemosa, 417. Strengthens contractions of uterus without prolonging them as ergot does, and so endangers less life of child and soft structures of mother. Sometimes given for after pains, but ergot preferable here.

Beneficial in mental disturbance before or after confinement.

Useful when lochia are suppressed.

Castor oil, 296. As purgative afterwards.

Chloral, 349. In 15 gr. doses every quarter of an hour till sleep induced—applicable toward termination of first stage.

Chloroform, 339.

Emetics, 400. Or mechanical irritation of pharynx in flooding.

Ergot, 568. In tedious labour where uterus is becoming exhausted but where there is no obstruction to the passage of the child. (See ref.)

Extremely useful in *post partum* hæmorrhage.

Hamamelis, 305. For long continued oozing of blood afterwards.

Ipecacuanha, 400. In flooding—also recommended after delivery to promote natural functions.

Iron, 207. Injection of four oz. of liq. ferr. perchlor. with twelve oz. water in grave cases of flooding after delivery—care to be taken not to introduce air.

Morphia, 538. Hypodermically in tedious labour produced by rigid os uteri.

Opium, 549. A drachm of the tinct. with brandy in profuse flooding.

Quinia, 580. To strengthen uterine contractions—used by some American writers in preference to ergot.

CONJUNCTIVITIS (*See Eyes, Diseases of*).

Belladonna, 507. Locally and internally

Blisters, 81. Behind the ear.

Castor oil, 298. A drop in the eye often allays pain and intolerance of light caused by an irritant.

Mercury and morphia, oleate of, 227. Outside the eyelid in palpebral conjunctivitis.

Opium, 539. The wine of the 1864 Pharmacopœia dropped into the eye relieves pain and improves condition of the membrane.

Silver, nitrate of, 220. Solutions of various strength dropped into the eye.

Zinc, 247. A weak solution of sulphate as drops.

CONSTIPATION.

Aloes, 601. In chronic cases. Often combined with iron. (See p. 602.)

Belladonna, 508. One-sixth to one-fourth of the extract once a day, especially when dyspepsia. Sometimes a suppository of 1 or 2 grs. efficacious in severe cases

Carlsbad water, 186, 255. In habitual constipation—best to use a system as at Carlsbad (see ref.).

Castor oil, 296. A speedy, certain, and mild purgative. Not good for habitual constipation.

Cod liver oil, 292. In the obstinate constipation of children.

Coffee, 570. Is slightly purgative to some persons.

Colocynth, 600. A few drops of the Prussian tincture several times a day in obstinate constipation.

Croton oil, 297. A very powerful purgative, sometimes employed in obstinate constipation where other purgatives fail.

Diet, 185. Porridge, brown bread and exercise when busy worried men become irritable and suffer from headache, unless the bowels act every day. If these remedies fail, try fruit before or after breakfast, or natural purgative waters.

Enemata, 53. To unload the bowels, but the

CONSTIPATION—*continued.*

habitual use of warm enemata will increase the torpor of the bowels.

Ipecacuanha, 391. A grain every morning fasting for constipation from great torpor of intestines. It is said to assist the action of the other purgatives.

Jalap, 604. And scammony in obstinate constipation.

Lime, 176. As saccharated solution—this must not be taken on an empty stomach.

Magnesia, bicarbonate of, 171. *i.e.*, fluid magnesia. A useful and mild aperient. Often combined with rhubarb.

Mercury, 233. Calomel, or grey powder, as a purgative.

Natural waters, 184. Pullna. Friedichshall, or Hunyadi—from a wine glassful to half-a-tumbler or more, with an equal quantity of hot water before breakfast.

Pullna or Friedrichshall mixed with milk a good purgative for children.

Nux vomica, 555. The extr. with rhubarb or colocynth shortly before dinner, aids digestion and the unloading of the bowels. One or two drops of the tinct, two or three times a day will do instead.

Oranges, 185. One or two before breakfast for moderate habitual constipation, or a glass of cold water before and an orange soon after breakfast.

Podophyllum, 411. 1 or 2 drops two or three times a day of a solution of 1 grain of the resin in 1 drachm of alcohol for children with hard, clayey, perhaps mottled stools occurring after an attack of diarrhœa (often observed in infants who are spoon-fed).

Rhubarb, 606. A useful purgative for children especially when mixed with two or three times its weight of carbonate of soda.

Senna, 598. Well combined with a bitter tonic, as gentian.

Soap, 158. Added to anal injections to suspend castor oil or turpentine, or a piece the size of the thumb wetted with castor oil or water may be thrust up the rectum to produce a motion especially in infants and children.

Sulphates, 188. In purgative natural waters—small doses often repeated. Sulphate of potash has in some cases proved poisonous,

Sulphur, 92. 10 grs. with conf. sennæ. or as the German comp. liquorice powder in milk—the latter good for children.

Tobacco, 461. A smoke after breakfast sometimes beneficial in habitual constipation.

CONVALESCENCE.

Alcohol, 320. Before or at meals.

Calumba 598. When the stomach is weak.

Fats, 290. Especially cod liver oil.

Lime, 176. As lime-water or carbonate of lime, in convalescence from serious diseases.

Opium, 542. As laudanum injected into the rectum for the wakefulness of convalescents.

Sea baths, 12.

CONVULSIONS.

Bromide of potassium, 124. In all forms.

Chloral, 350. In children—5 grs. by mouth or rectum.

Chloroform, 340. Inhalations of great service in children, also in puerperal convulsions.

Ice, 42. To head.

Morphia, 538. Hypodermically sometimes arrests puerperal convulsions.

Spinal ice bag, 45. In infantile convulsions.

CONVULSIONS—*continued.*

Veratrum viride, 404. Has been employed.

Bitartrate of potash, 188. When due to poisoned blood.

CORYZA AND HAY FEVER.

Aconite, 424. In severe colds with much chilliness, aching of limbs, a hot dry skin and quick pulse.

——— 268. In true hay fever.

Ammonia, 168. Inhalation in early stage.

Arsenic, 257. In chronic coryza. Also in periodical attacks of persistent sneezing, with coryza, frontal headache, and often an itching of the nostrils; sore throat, wheezing, and profuse expectoration may supervene. Often this affection, allied to peptic asthma, may be brought on by food or by irritation of dust or pollen. Aconite liniment may be applied to the itching part of the nose.

Arsenic of little use in true hay fever, then aconite internally best. (See pp. 257–268.)

Camphor, 367. Inhaled or taken by the mouth at the very beginning sometimes arrests it.

Chlorate of potash, 194. Eight or ten lozenges a day will stop many a cold at its commencement.

Iodide of potassium, 112. Ten grains at bedtime at onset to cut short acute cold in head; also useful in chronic colds.

Ipecacuanha, 398. In hay asthma.

Iodine, 108. Inhalation in daily attacks of cold accompanied by itching of nose or inner canthus.

Opium, 549. At night at the very beginning will often cut short an attack of coryza. A glass of hot grog assists its action.

Sulphurous acid, 147. Inhalation, spray, or fumigation in coryza.

Turkish bath, 30. In coryza.

Veratrum viride, 268. If arsenic unsuccessful.

COUGH.

Alcohol, 328. As brandy or wine. Porter and beer often aggravate coughs.

Alum, 198. Ten grs. to one drachm of water as spray in chronic cough; also internally in spasmodic coughs.

Belladonna, 519. Often useful—no rules can be given.

Carbonic acid gas, 88. As inhalation in irritable cough.

Chloroform, 332. With morphia and treacle when cough paroxysmal and violent with very slight expectoration;—when it arises from morbid condition of throat this mixture may be painted on.

Cod liver oil, 292. In chronic coughs.

Conium, 468. Supposed useful in whooping and other coughs.

Creosote, 315. In winter cough.

Croton chloral, 357. In night cough of phthisis.

Gelseminum, 493. When excessive excitability of respiratory centre—ether, chloroform, and opium also useful.

Glycerine of tannin, 302. As application to the throat when chronically inflamed and so productive of cough, which is often the case in children.

Iodine, 108. Inhalation for children with hoarse, hollow cough accompanied by hoarseness and wheezing at the chest.

Ipecacuanha, 393. In obstinate winter cough with wheezing the wine applied as spray to the fauces is very efficacious.

Opium, 539. When cough due to inflamed or

Cough—*continued.*
even ulcerated throat. Morphia lozenges or morphia with glycerine in these cases, which are common in chronic phthisis, very useful. Sometimes also opium and morphia administered so that the medicine clings for some time in contact with structures just outside the larynx effectual in coughs entirely dependent on lung disease.
Tar, 315. In winter cough, especially when paroxysmal.
Turkish bath, 19. In winter cough.

Cracked Nipple. (*See Nipples, Sore*).

Crick in the Neck.
Croton oil, 297. Medicinally.

Croup.
Aconite, 424. Valuable in catarrhal croup (spasmodic laryngitis).
Alum, 198. One drachm in honey or syrup every ten or fifteen minutes till vomiting induced. In severe cases vomiting should be caused three or four times a day, treatment to be begun early.
Copper, sulphate of, 245. In small and frequent doses as a vomit.
Lobelia, 564. Has been employed.
Senega, 608. Given by some.
Sulphurous acid, 147. Spray hourly or oftener in acute attack.
Tannin, 303. A spray containing 5 per cent. of tannin several times a day for fifteen or twenty minutes.
Zinc, sulphate of, 247. As emetic, but others generally preferred.

Cystitis.
Alkalies, 164. Citrates and bicarbonates used to make urine alkaline, when urinary organs irritated or inflamed. When urine already alkaline alkalies must be intermitted.
Buchu, 375. Also copaiba and cubebs in chronic inflammation of bladder and urethra.
Cantharides, 381. A drop of the tincture (five sometimes required) three times a day.
Carbolic acid, 317. And sulpho-carbolates may possibly be used in preserving the urine sweet in cystitis.
Hot enemata, 53. To relieve pain.
Iodoform, 344. A suppository for painful diseases of rectum and bladder.
Opium, 542. An injection of laudanum with starch will subdue pain and frequent micturition.
Turpentine, 373. Has been useful in chronic cystitis..

Dandriff. (*Pityriasis of Scalp*).
Borax, 152. Head to be sponged several times a day with a saturated solution, or the glycerine of borax may be used.

Deafness. (*See Ears, Diseases of.*)
Glycerine, 298. For dryness of meatus—also to form a film to cover ruptured tympanum.
Glycerine of tannin, 302. As application for throat deafness.

Debility.
Alcohol, 324. A wine with much ether in debility of old age, especially where sleeplessness, indigestion and stomach cramps.
— —— 329. Stout or rum and milk, especially from town-living women.
Arsenic, 274. For swelled feet of old or weakly persons and for breathlessness from weakly acting heart.
Calumba, 598.
Cod liver oil, 290. In chronic degenerative diseases of old age.
———— 292. In chronic diseases of children.
Chiretta, 599.
Gentian, 598.
Hypophosphites, 181. Of lime or soda in nervous or general debility.
Iron, 200. In anæmic subjects.
Phosphate of lime, 179. When from prolonged town life or overwork, a grain each of phosphate of lime, phosphate of iron and carbonate of lime for a dose.
Quassia, 598.
Quinia, 580. For pale, badly fed, town-dwellers.
Sea bathing, 12. In chronic illnesses with debility.
Turkish baths, 31. When caused by the tropics, caution is necessary.
———— 30. When town-dwellers become stout and flabby.

Delirium.
Antimony, 253. In delirium of typhus and other fevers. (See fevers).
Belladonna, 519. In delirium of typhus and other fevers.
Bromide of Potassium, 131. In delirium resembling delirium tremens, also in acute mania.
Camphor, 369. In large doses.
Chloral, 349. In violent delirium of fevers.
Cold douche, 28. In maniacal delirium—place patient in warm bath during the application.
Opium, 543. Best given in traumatic delirium as a rectal injection.
——— 546. Combined with tartar emetic in fevers, or better still, morphia may be given hypodermically. Laudanum in low muttering delirium.

Delirium Tremens.
Antimony, 254. Tartar emetic with opium to control mania and sleeplessness.
Bromide of potassium, 127. Especially in earlier stages, and in dispelling delusions remaining after partial subdual of attack.
Capsicum, 386. To induce sleep in early stages.
Chloral, 348. Especially when administered at the onset of the symptoms.
Chloroform, 340. Inhalation has been advised to procure sleep.
Digitalis, 459. Half an ounce of the tincture, repeated if necessary in four hours and again in six, and afterwards when needful in two-drachm doses. (See ref.)
Hyoscyamus, 529. Or Hyoscyamia, probably useful where delirium like that of acute intermittent delirium.
Ice, 42. To head.
Opium, 543. Given as rectal injection.
——— 547. Hypodermically or with porter or spirits. Test urine first.

If patient strong, delirium boisterous and pulse full, tartar emetic or aconite should be added.

DEPRESSION AND DESPONDENCY.

Bromide of Potassium, 128. Especially in townspeople.

Phosphorous, 283. In depression from overwork.

DIABETES.

Alkalies, 158. Have been suggested.

Bromide of potassium, 131.

Glycerine, 299. To be used in place of sugar.

Opium, 548. Very useful.

Oxygen, 84.

Salicylate of soda, 597. Has cured where all other drugs have failed.

Tepid drinks, 47.

Valerian, 378. Large and increasing doses in diabetes insipidus.

DIARRHŒA.

Alkalies, 158. Bicarbonates of potash, soda or magnesia when due to excess of acid in intestines.

Alum, 198. Sometimes useful in acute and chronic diarrhœa, and in that of typhoid and dysentery.

Ammonia, 168. In after stages when mucous membrane continues to pour out watery secretion which perpetuates the diarrhœa.

Arsenic, 270. One drop of liq. arsen. before meals for dyspeptics when diarrhœa excited by food.

Also useful in other chronic forms of diarrhœa. even when due to organic disease.

——— 277. For copious discharge of membranous shreds from bowels and uterus with emaciation, neuralgia, dysmenorrhœa, &c.

Attention to feeding, 238. Small quantities of food frequently.

Bismuth, 209. Half a drachm to a drachm of the nitrate in chronic diarrhœa as in that of phthisis sometimes valuable when all else has failed—should be given in milk.

A grain hourly with milk with sometimes one-sixth gr. grey powder in various forms of diarrhœa of young children.

Camphor, 368. In summer diarrhœa, in acute diarrhœa of infants (may be given in milk), in diarrhœa caused by effluvia of drains, or exposure to cold.

Capsicum, 386. In summer diarrhœas and in those persisting after expulsion of exciting irritant.

Carbonate of lime, 176. In the later stages when the irritant got rid of. As chalk mixture in diarrhœa from more serious causes as typhoid or phthisis.

Castor oil, 298. In early stages to carry away irritant.

Children's diarrhœa sometimes yields to eight or ten drops suspended in mucilage.

Chammomile, 599. An infusion useful in summer diarrhœa of adults, or of children from teething.

Chloride of ammonium, 182. In catarrhal conditions of intestines.

Chloride of calcium, 176. In chronic diarrhœa with weak digestion. (See ref.)

Chloroform, 332. As sp. chloroformi combined with astringents and opium after removal of excitant.

Cod liver oil, 292. In chronic diarrhœa of children with pale stinking motions, wrinkled skin and perhaps vomiting.

Cold or tepid packing, 15. In summer diarrhœa of children.

DIARRHŒA—*continued.*

Copper sulphate, 245. By mouth or as injection in severe chronic or acute diarrhœa with or without organic disease.

Flannel binder, 233. Round the belly in infantile diarrhœa.

Injections, 54, 55. Of starch water at 100 degrees F. with laudanum and acetate of lead or sulphate of copper. Invaluable in urgent cases such as the choleraic diarrhœa of children.

Ipecacuanha, 391, 392. Hourly drop doses of the wine, especially if vomiting be present, in dysenteric diarrhœa of children.

Iron, 202. Astringent preparations, especially the pernitrate.

Lead, 212. A few grs. of the acetate with a small dose of morphia, a sure and speedy remedy for summer diarrhœa; the acetate with opium in purging due to dysentery, typhoid, or tubercular disease of intestines.

It increases the efficacy of a starch injection. It may be used as a suppository.

Lime water, 89, 176. In chronic vomiting with diarrhœa in young children.

Mercury, 235. A third of a grain of grey powder every hour or two in diarrhœa of children with bad digestion, flatulent distension and clayey stinking motions.

Where children or adults suffer from acute or chronic diarrhœa, with slimy perhaps bloody stools and pain and straining, give frequent teaspoonful doses of a solution of one grain of bichloride in ten oz. of water.

Grey powder, a sixth of a grain at first hourly, then every two or three hours in infantile diarrhœa with watery and offensive, muddy or green stools to the number of ten or twelve a day—vomiting is an additional indication for this treatment.

In all cases of infantile diarrhœa little food should be given, but frequently.

When children pass large acid, offensive, curdy stools, mercury of little use—here milk should be entirely withheld.

The chronic diarrhœa of adults with watery pale stools often yields to the hundredth of a grain of corrosive sublimate every two or three hours, this may be employed in diarrhœa of typhoid or phthisis. (See also p. 412.)

Nitric acid, 105. For straining diarrhœa of children when motions green, curdled and mixed with mucus; also in chronic diseases of children with sour smelling pale and pasty motions, especially if acid combined with pepsin.

Opium, 541. Or morphia in acute forms after expulsion of offending matter, also in chronic diarrhœa of tuberculosis, dysentery and other organic diseases. In typhoid fever. where there is wakefulness, delirium and diarrhœa, it will often subdue these symptoms.

In dyspepsia with diarrhœa, common in children, where there is sinking at the stomach, relieved for a short time by food, and the occurrence of an evacuation of partially digested food immediately after the meal. Two to five drops tr. opii a few minutes before each meal very efficacious, but arsenic even more so.

——— 542. An injection with starch in acute and chronic diarrhœas, including those severe forms which sometimes carry off young children in a few hours. Also in typhoid, tubercular ulceration of intestines and dysentery.

Phosphate of lime, 178. In chronic diarrhœa, tubercular or otherwise.

——— ——— ——— 180. In chronic diarrhœa, especially that of young children, may be given with carbonate of lime and lactate of iron.

DIARRHŒA—*continued.*

Podophyllum, 412. In chronic diarrhœa with high coloured motions and cutting pains; also in morning diarrhœa; also in chronic diarrhœa with watery, pale, frothy motions, with severe cutting pain.
Rhubarb, 531. In early stages to get rid of irritant and afterwards to check the diarrhœa.
Salicylic acid, 597. As injection in dysenteric diarrhœa of children.
Silver, nitrate of, 222. In acute and chronic diarrhœa.
Spinal ice bag, 45. For cramps. Also when due to excessive action of mucous membrane.
Sulphuric acid, 143. In summer and choleraic diarrhœa. Small doses in chronic diarrhœa; also in hectic.
Tannin, 303. As catechu, kino, red gum, rhatany and hæmatoxylum in acute and chronic diarrhœa, internally or as injections.
Veratrum album, 405. Has been used with advantage in the vomiting and purging of summer diarrhœa.
Rumex Crespus, 412. In morning diarrhœa.
Zinc, oxide of, 247. Two to four gr. doses every three hours in diarrhœa of children.

DIPHTHERIA. (*See Throat, Diseases of.*)

Chlorinated soda, 104. Strong solution to throat.
Chlorine solution, 104. For sloughing of throat.
Hydrochloric acid, 139. Locally.
Ice, 42. To be sucked especially at commencement and continued constantly till disease declines.
Iodine, 108. As inhalation. (See formula, p. 108.)
Iron, 205. Large doses of perchloride—solution better than tincture—every hour or oftener. Solution also to be gently painted on throat or applied with atomizer.
Silver nitrate, 182. Of doubtful benefit.
Strychnia, 553. Hypodermically for paralysis after diphtheria.
Tannin, 253. As spray (5 per cent. solution).

DIPSOMANIA.

Arsenic, 269. For distressing vomiting—one drop of liq. arsen. before breakfast.
Capsicum, 386. Large doses before meals and whenever depression and craving for alcohol occurs. With bromide or arsenic and bitters to assist in overcoming habit.

DROPSIES.

Acupuncture, 58. Or better still incisions from three quarters to an inch long—one over each external malleolus generally sufficient. Keep a hot moist sponge containing carbolic acid to incisions, and put feet and ankles into hot bath for an hour night and morning. More useful in Bright's disease and in aortic than in tricuspid mischief.
Arsenic, 274. For swelled feet from debility.
Bitartrate of potash, 187. Especially in general dropsies; useful in Bright's disease to prevent watery accumulations and to draw off effete matters.
Colocynth, 601. Has been used.
Copaiba, 376. In some cases of ascites and Bright's disease
Digitalis, 456. The fresh infusion is best in heart disease.

DROPSIES—*continued.*

Elaterium, 600. In kidney and heart disease; must be employed cautiously. (See ref.)
Jalap, 604. In combination with other substances.
Juniper, 377. Esteemed by some in scarlatinal dropsy.
Squill, 604. Recommended in all forms.
Iodide of potassium, 116. In some cases of Bright's disease,

DYSENTERY.

Alum, 198. For the diarrhœa.
Arsenic, 277. (See Diarrhœa.)
Cascarilla, 599. Has been employed.
Hamamelis, 305. When discharges contain much blood.
Injections, 55. A pint of water with ten to twenty grains of sulphate of copper in the diarrhœa of chronic dysentery.
Large emollient enemata useful in early stages of dysentery.
Ipecacuanha, 391, 392. Large doses required. The dysenteric diarrhœa of children will often yield to hourly drop doses of ipecacuanha wine, especially if vomiting present.
Lead, 212. The acetate with opium for purging.
Mercury, 235. A hundredth of a grain hourly or every two hours of the bichloride in acute or chronic dysentery, if stools are slimy and bloody.
Opium, 542. For the purging.

DYSMENORRHŒA.

Actea, 417.
Arsenic, 277. When accompanied by copious discharge of membranous shreds from bowels and uterus.
Cajeput, 375.
Cannabis indica, 567. Very useful.
Croton chloral, 352. In dysmenorrhœal neuralgia.

DYSPEPSIA.

Alcohol, 320. In loss of appetite and digestive power from fatigue, a glass of wine or a little brandy and water before food; useful also in indigestion during convalescence from acute diseases or in town-dwellers. During acute disease alcohol should be given with food, little and often.
Alkalies, 134, 140. Shortly before a meal increase gastric juice, *usually* better than acids in atonic dyspepsia.
——— 156. Bicarbonate of soda best.
Aloes, 601. In combination, for habitual constipation with dyspepsia.
The compound decoction a good after-dinner laxative. One grain of the watery extract with nux vomica, gentian or cinchona, a good dinner pill.
Arsenic, 269. One drop of liq. arsen. before food in irritative dyspepsia and dyspepsia in which diarrhœa is excited by food.
Belladonna, 508. One-sixth to one-fourth of the extract once a day when there is constipation.
Bismuth, 209. Mixed with vegetable charcoal in flatulent dyspepsia.
Calumba, 598. Easily tolerated when stomach weak.
Cascarilla, 599.
Charcoal, 87. Where there is flatulence. (See ref.)

DYSPEPSIA—*continued.*

Chiretta, 599. Shortly before food.
Cod liver oil, 292. In the "craving" at the epigastrium of the aged if intestinal canal not in an irritable condition.
Colchicum, 408. In gouty subjects.
Cold water, 49. Half a tumbler half an hour before breakfast.
Creosote, 313. Often relieves stomach pains occurring after food.
Drinking little and only some time after meals, 49. In "Indigestion of fluids."
Gentian, 598. Often mixed with senna.
Hydrochloric acid, 140. Dilute, after a meal increases gastric juice.
Ipecacuanha, 388. In irritative dyspepsia, acute and chronic. Also when associated with constipation, depression, and food lying on the stomach "like a heavy weight." (See p. 391.)
Mercury, 238. A grain of grey powder three or four times a day in dyspepsia occurring during chronic disease or in convalescence.
If constipation, half a grain of calomel with three grains extract hyosc. in pill for three nights is better.
Mineral acids, 141. For eructations of offensive gas with or without oxaluria.
Morphia, 537. Hypodermically, when dyspepsia of an irritable kind in an irritable subject.
Nux vomica, 554 Where flatulence, weight on head and heartburn.
Opium, 541. When sinking at stomach relieved temporarily only by food which produces an evacuation almost immediately of partially digested matters, common in children, two to five drops of tr opii a few minutes before meals very useful. Arsenic even more so.
—— 549. In nervous people with weight on head, flushings, perspirations, and depression. A drop of laudanum with two of tr. nucis vom. three or four times a day.
Oxygen, 84. In phthisis, not febrile,
Podophyllum, 411. For cankery taste especially in the morning. If this fail try mercury.
Quinia, 572. Especially in elderly people living in towns. Checks excessive fermentation in the alimentary canal.
Senna, 607. Combined with gentian when there is constipation.
Sulpho-carbolate of soda, 314. And carbolic acid both useful in flatulence, especially when it occurs immediately after a meal or gives rise to "spasms." In these cases phosphorus is, however, better.
Tannin, 303. In irritative dyspepsia.
Turkish bath, 30. For slight indigestion and malaise after dining out.

EAR DISEASES. (*See also Otorrhœa.*)

Aconite, 429. In otitis.
Counter-irritation, 81. By blistering fluid or croton oil liniment behind the ear often relieves earache.
Glycerine, 298. For dryness of meatus and as a film to cover the tympanum when ruptured.
Strychnia, 553. Hypodermically.

ECTHYMA.

Quinia, 580. For mal-nutrition on which the ecthyma depends.

ECZEMA.

Alum, 195. Applied to check profuse discharge, but usually insufficient to heal of itself.
Arsenic, 274. In chronic forms, especially of vulva, anus and scrotum. Largest dose five min. of liq. arsenicalis three times a day, never on an empty stomach. For rules to be observed in giving arsenic (see ref.)
Benzoin, 374. The compound tincture, painted on the skin to allay itching.
Bismuth, 173, 208. Nitrate or carbonate, as dusting powder, but generally greasy applications preferable.
Blisters, 82. Especially in eczema of hands, applied around or near the disease.
Borax, 153. As glycerine of borax in eczema of ears and scalp.
Camphor, 367. As addition to dusting powders to allay heat and itching.
Carbolic acid, 311. In chronic eczema, or better still liq. carbonas detergens, oil of cade, and oleum rusci. In the weeping stage if inflammation not great ten min. carbolic acid to one oz. of lard, also in eczema capitis. Sometimes tar better than its ointment; on the back of hands undiluted petroleum but rather painful.
—————— 312. Petroleum, cade and carbolic soaps useful.
Carbonate of lime, 173. As dusting powder.
Carbonate of potash or soda, 134, 151. A weak solution applied when raw surface weeps copiously. (See p. 151.)
Caustic potash, 152. As liquor potassæ locally in chronic eczema.
Cinchona, 572. Powdered bark locally to check profuse secretion, probably cheaper preparations of tannin as useful.
Cod liver oil, 152. Or glycerine applied at night to obviate brittleness of skin when caustic lotions used.
Cyanide of potassium, 533. Or hydrocyanic acid, see "Itching."
Glycerine, 152, 298. Or better still glycerine of starch for rough skin left after eczema.
Glycerine of tannin, 301. In most forms.
Lead, 210. Soluble salts as lotions when much inflammation and copious discharge.
If great inflammation, surface to be covered constantly with rags soaked in the lotion. In some cases a poultice at night and lotion during the day. A strong lotion best in diffused eczema without weeping but with much itching. A weak alkaline or sulphur bath assists action of lotion. Equal parts of emp. plumb. and linseed oil applied on soft linen twice a day invaluable in subacute stage. (See p. 212.)
Lime water, 173. As sedative and to check discharge. After inflammation subdued lime water and glycerine a comforting application.
Mercury, 225. Citrine ointment, especially when skin healed, very useful when eczema attacks hairy parts of face, sometimes well to mix it with tar ointment.
Milk, 152. With water as local application.
Silver-nitrate, 219. To be painted on limited patches, most serviceable after weeping stage.
Oil of cade, 152. Equal parts soft soap, rectified spirit and oil of cade, night and morn.
Oils and fats, 286. To prevent irritation from the discharge, generally mixed with oxide of zinc.
Simple oils facilitate the removal of scabs.
Potato poultice, 40. Cold, sprinkled with powder composed of camphor, talc and oxide of zinc, when much inflammation and sensation of heat, or the powder alone may be dusted over surface.
Poultices, 36. If skin is much inflamed.
Soap, 152. Moist, weeping surface to be washed with soap and water night and morn.

Eczema—*continued.*

Sulphides, 94. As baths, not in acute stage.
Sulphur, 94. Internally.
Tar, 315. In treacle, pills or capsules, from three to fifteen min. for a dose in chronic eczema.
Turkish bath, 19.
Warm bath, 21. Especially in acute stages—rain-water best.
Yolk of egg, 152. With water as local application.
Zinc, 247. The ointment of the oxide as a mild stimulating application after inflammation subsided when raw surface indolent.
Oxide and carbonate used as dusting powders, generally greasy applications better. (See p. 173.)

Emissions. (*See Spermatorrhœa*).

Emetics, depression from.
Ammonia, 169. Combined with other emetics to obviate depression.

Emphysema. (*See Bronchitis.*
Arsenic, 274. For emphysematous persons who on catching cold are troubled with slight wheezing and some dyspnœa. If bronchitis or dyspnœa very severe lobelia or belladonna better. Arsenic especially useful where this affection can be connected with the recession of a rash.
Cod liver oil, 292. Checks degeneration.
Chloral, 350. For the shortness of breath brought on in emphysematous persons by catching cold. If obstructed circulation, caution required.
Lobelia, 563. Allays the dyspnœa which accompanies capillary bronchitis in emphysema.
Purging, 605. In obstruction of right heart.

Empyema.
Carbolic acid, 312. A weak solution to be injected after evacuation.
Chlorine solution, 103. For washing out cavity.
Iodine, 107. Solution to be injected after tapping.
Quinine solution, 104. For washing out cavity.

Energy, lack of.
Turkish baths, 30. Useful to town-dwellers, with soft flabby tissues and mental depression.

Epididymitis.
Oleate of mercury and morphia, 227. Locally.

Epilepsy.
Arsenic, 276. Sometimes useful.
Belladonna, 518. For method (see ref.).
Bromides, 124. (See ref.).
Copper, 245. The salts have been given.
Counter-irritation, 348. (See ref. for discussion).
Iron, 205. Especially when anæmia or uterine obstructions.
Musk, 314. Has been given.
Nitrite of amyl, 363. As inhalation or in two to five min. doses in mucilage, especially where fits are very frequent.
Silver, 212. Nitrate or oxide occasionally given with benefit.
Spinal ice bag, 45.

Epilepsy—*continued.*
Valerian, 377. Has been used with occasional advantage.
Zinc, 248. As oxide or sulphate—bromide better.

Epistaxis. (*See Hæmorrhage*).
Aconite, 429. Small and frequent doses often quickly check epistaxis in children and plethoric people.
Alum, 196. May be injected or snuffed up in powder.
Compression of facial artery, 400.
Digitalis, 458. The infusion best.
Ergot, 567. Hypodermically if urgent in two to five grain doses May also be given by the stomach.
Hamamelis, 306. (See hæmorrhage).
Ipecacuanha, 400.
Spinal hot-water bag, 47. To cervical and upper dorsal vertebræ.

Eructations, offensive.
Mineral acids, 141. To correct the oxaluria on which the eructations depend.

Erysipelas.
Aconite, 428. Administered at commencement, often at once cuts short the attack.
Very useful in the erysipelatous inflammation following vaccination—belladonna ointment may likewise be used.
Belladonna, 520. Internally and externally may be used with aconite
Collodion, 283. Painted over superficial erysipelas, but this often cracks and is inferior to a solution of nitrate of silver in water or in nitrous ether.
Digitalis, 458. Infusion locally.
Hot fomentations, 41. When limb extensively affected.
Iodine, 82. Paint affected and circumjacent skin with solution to prevent spreading.
Iron, 206. Large doses of perchloride very frequently.
Silver, nitrate of, 219. The skin to be well washed with soap and water, then with water, and to be wiped quite dry—Next a solution of eighty grs. of the brittle stick to four drms. of water, to be applied two or three times to inflamed surface, extending two or three inches beyond it.
Sulphurous acid, 147. Equal parts of P.B. acid and glycerine.

Exophthalmac Goitre. (*See Goitre.*

Exhaustion.
Ammonia, 169. Internally its influence is but brief.
Coffee, 570. Or tea, both in hot and cold climates.
Phosphorus, 282. For physical and mental exhaustion. Influence questionable.

Eyes, diseases of. (*See Conjunctivitis*).
Atropia, 507. In iritis locally. Hypodermically in glaucoma.
Belladonna, 507. Locally and internally in iritis. conjunctivitis and other inflammations.

EYES, DISEASES OF—*continued.*

BLISTERS, 81. Behind ear or to temple in rheumatic, gouty and simple inflammation—blistering paper enough. Obstinate forms of tinea tarsi sometimes yield to flying blisters on the temple.

CASTOR OIL, 298. Applied to allay pain from an irritant, as sand.

CHLOROFORM, 330. Vapour of, close to a photophic eye relieves.

MERCURY, BICHLORIDE OF, 243. Of great service in iritis.

——— **AND MORPHIA, OLEATE OF**, 227. Outside the eyelid in palpebral conjunctivitis and hordeolum: also in syphilitic iritis (p. 228).

STRYCHNIA, 553. Hypodermically in muscular asthenopia, amblyopia, tobacco amaurosis, and in progressive nerve atrophy not dependent on intra-cranial disease, also in traumatic amaurosis.

FÆCES, HARDENED.

ENEMATA, 52. A tube may be passed through the mass (see ref.).

EXTRACTION, 52. By finger.

FAINTINGS.

ALCOHOL, 326. As brandy or wine when heart suddenly enfeebled from fright, &c.

AMMONIA, 168. Breathed into the air-passages.

——— 131. Internally.

COLD WATER, 3. Sprinkled on face.

CHLOROFORM, 331. Internally, but effects more transient than those of alcohol;—often given to hysterical people.

POSITION, 326. Patient should lean forward with the head as low as possible between the legs.

FATIGUE.

DRIPPING WET COLD SHEET, 14. As a restorative and to prevent aching of muscles.

ARNICA, 15. A few drops of tinct. internally for aching of muscles.

ACTÆA, 417. For headache from over study or excessive fatigue.

COFFEE, 570. And tea both in hot and cold climates.

FAVUS. (*See Tinea*).

FEVERS.

ACETATE OF AMMONIA, 170. Is a good diaphoretic, and is especially useful in the milder forms as in common catarrh.

ACID DRINKS, 47. Such as raspberry vinegar, citric, or tartaric acid (see pp. 47 and 138).

ACONITE, 422. Has a marvellous power of controlling inflammation and subduing fever.

ALCOHOL, 326. When tongue and skin become moist, the breathing more tranquil, and sleep gained under its use.

ALKALIES, 164. Citrates and acetates are considered as febrifuge. They possibly eliminate urinary water.

AMMONIA, CARBONATE OF, 169. In scarlet fever and measles.

ANTIMONY, 251. Tartar emetic wine as a diaphoretic; large doses are given by some to cut short acute specific fevers and inflammations. Ague may sometimes be cured by antimony, and this often assists quinine in curing it. Ipecacuanha and other emetics should be preferred.

FEVERS—*continued.*

——— 253. When much excitement and delirium, tartar emetic in full, with opium in small, doses, but if wakefulness predominates with not very boisterous delirium the antimony to be reduced, and the opium increased.

ARSENIC, 274. Sometimes given in prostrating acute fevers to strengthen pulse and invigorate patient.

BELLADONNA, 519. In delirium.

BITTERS, 139. As orange peel or cascarilla mixed with acid drinks to quell thirst.

BLISTERS, 78. Flying, or mustard poultices in the semi-comatose state sometimes following fevers, &c.

CAMPHOR, 369. In adynamic fevers and where there is delirium.

CASTOR OIL, 296. As purgative.

CHLORAL, 348. In violent delirium of typhus.

COLD AFFUSION, 16. At the beginning of acute fevers.

——— 28. Applied gently over forehead for headache.

COLD BATHS, 16. Employed early diminish frequency of pulse, strengthen heart, prevent delirium, produce sleep, lessen risk of bed-sores or exhausting suppuration.

— **PACKING**, 23. In specific fevers and acute inflammatory diseases—especially useful on the retrocession of the rash.

CONIUM, 467. Has been recommended as it reduces the frequency of the pulse.

DIGITALIS, 458. Large doses often required to reduce temperature, much used in fevers on the continent, especially recommended in typhoid.

GLYCERINE, 298. For keeping moist the lips, tongue and gums when dry and coated with mucus in acute diseases.

HOT AFFUSION, 28. Over forehead for headache, sometimes better than cold.

ICE, 47. To be sucked for allaying thirst.

ICE-BAG, 28 and 42. To forehead for headache.

MUSK, 314. And castoreum have been given in fevers to prevent prostration.

MUSTARD, 383. As bath on recession of the rash of an eruptive fever.

OPIUM, 546. For delirium, either noisy or muttering with picking of bed-clothes. If furious, tartar emetic should be combined with the opium. Morphia hypodermically is often the best way of administering an opiate. In extreme weakness with sleeplessness, and brown, dry tongue, laudanum helps a patient over the critical stage with less alcohol than would otherwise have been required.

PHOSPHATE OF LIME, 178. In hectic.

QUINIA, 579. Especially in typhoid.

SALICYLIC ACID AND SALICYLATE OF SODA, 592–597. In large (one drachm) doses every night, or in smaller and more frequent doses, reduce temperature in most febrile diseases especially in rheumatic fever.

SPONGING WITH WARM WATER, 21.

STRYCHNIA, 553. Hypodermically for paralysis after low fevers.

SULPHATE OF MAGNESIA, 188. Or phosphate of soda as purgative (see ref.).

WARM BATH, 21. In simple fever of children.

FEVERISH COLD. (*See Coryza*).

FISSURE.

BELLADONNA, 506. The extract locally.

BROMIDE OF POTASSIUM, 120. In five parts of glycerine as local application in fissures of rectum.

CASTOR OIL, 296. In fissure of anus.

FISSURE—*continued.*

Forcible distention, 506. See note.

Ice, 42. As a local application to remove pain after operation.

Opium, 542. With gall ointment for fissures of anus. Mild purgatives should be simultaneously employed.

Sulphur, 92. As a mild purgative to cause soft motions.

FLATULENCE.

Abstention from sugar and starchy food, 88. Also from tea.

Ammonia, 168. In alkaline preparations for flatulent distension of stomach and intestines (palliative).

Assafœtida, 379. When unconnected with constipation or diarrhœa—useful for children,—one drachm of a mixture of one drachm of the tinct. to half a pint of water.

Bismuth, 88 and 209. Mixed with charcoal in flatulent dyspepsia.

Capsicum, 386.

Carbolic acid, 313. Most successful when no acidity.

Carlsbad water, 187. Where acidity, constipation and pain at epigastrium, over liver or between shoulders, with sallow complexion and jaundiced conjunctivæ.

Charcoal, 87. Five or ten grs. soon after meal if wind half hour or more after, but just before meal if wind formed during or immediately after it. Obviates both wind and acidity.

Chloroform, 331. Drop doses pure.

Essential oils, 375. Especially of cajeput and cloves, or spirit of horseradish.

Ipecacuanha, 389. When constipation, depression and weight on stomach, especially in pregnancy.

Mercury, 235. Half a grain three times a-day when flatulence accompanied by clayey stools.

Nux vomica, 88 and 554. When constipation, heartburn and weight on head.

Sulpho-carbolates, 313. Most successful when no acidity.

Sulpho-carbolate of soda, 314. Or carbolic acid in flatulence occurring immediately after meals, also when accompanied by "spasms," here however phosphorus better.

Sulphurous acid, 147. In five to ten min. doses when produced by fermentation.

FLUSHING HEATS.

Bromide of potassium, 128. Where mental depression at change of life.

Nitrate of amyl, 364. A tenth to a sixth of a minim in thirty times its volume of rectified spirit.

Nux vomica, 549. The tinct. combined with small quantities of laudanum in so-called hysteria of middle-aged people, with flatulence, weight on head and perspirations.

Valerianate of zinc, 377. At change of life. Some prefer valerian or its tincture.

GALL STONES.

Carlsbad waters, 187. A system required. (See ref.)

Chloral, 351. Sometimes relieves the pain.

GANGRENE.

Carbolic acid, 307. Locally.

Charcoal, 86. Poultices,—efficacy doubtful.

Oxygen, 84. As gaseous bath in senile gangrene.

GASTRALGIA AND GASTRITIS. (*See Stomach, Diseases of.*)

GIDDINESS.

Cod liver oil, 292. In giddiness of the aged when no serious brain disease.

GLANDS, ENLARGED.

Blisters, 82. Or iodine, 106.

Iodide of potassium, 109. As ointment.

——————— 115. For mamma and testicle, but especially for thyroid.

Mercury and morphia, oleate of, 227. In obstinate and painful tonsillitis and inflammation of lymphatic glands.

Sulphide of calcium, 97. For hard, swollen glands behind angle of jaw with deep seated suppuration.

GLAUCOMA. (*See Eye Diseases*).

GLEET.

Bismuth, 209. (See gonorrhœa).

Blister, 82. To perinæum in obstinate gleet.

Cantharides, 381. Drop doses.

Copaiba, 375.

Copper, 245. Solution of the sulphate as injection.

Glycerine of tannin, 304. With an equal quantity of olive oil or mucilage as injection—two drachms of this mixt. enough. Persevere eight or ten days after discharge ceased, and do not use at bedtime.

Iron, 208. (See gonorrhœa).

Lead, 212. (See gonorrhœa).

Lime water, 176. As injection.

Oil of sandal wood, 376. Fifteen minims three times a day.

Turpentine, 378.

Zinc, 245. The sulphate or chloride as injection.

GOITRE.

Belladonna, 517. Five min. of the tinct. hourly, of great service in exophthalmic goitre.

Iodide of potassium, 75. As ointment.

——————— 115. Internally and externally in hypertrophy of thyroid.

Iodine, 105. Liniment applied as often as state of skin will permit.

Mercury, biniodide of, 229. As ointment assisted by the sun's rays, remarkably useful in India. (See ref.)

GONORRHŒA.

Aconite, 429. A drop of the tinct. each hour in acute stage.

Alkalies, 164. As citrates or bicarbonates to make urine alkaline.

Avoidance of alcohol, 329. Very important.

Bismuth, 209. Half an ounce with equal weight of glycerine and three ounces water, useful as injection in chronic stage.

Blistering, 83. A flying blister every night for gonorrhœal rheumatism.

Cannabis indica, 567. Occasionally useful.

Cantharides, 381. Drop doses.

Copaiba, 375. Best in chronic form.

Copper, sulphate of, 245. Solutions are employed as injections.

GONORRHŒA—*continued.*

Cubebs, 376. In large doses at commencement.

Glycerine of tannin, 304. One drachm with equal quantity of olive oil or mucilage, as injection in after stages. Persevere eight or ten days after discharge ceased. Do not use any urethral injection at bedtime.

Iron, 208. Tinct. perchlor. half a drachm, tinct. opii one drachm to a pint of water as injection, or ferr. sulph. gr. xii, tinct. opii half oz. to eight oz. of water to be used three times a day.

Lead, 212. As injection sometimes employed.

Silver, nitrate of, 222. An injection of twenty grs. to the oz. said to cut short the attack—or one of one or two grs. to the oz. may be used several times a day.

Probably tannin is better both for gonorrhœa and gleet.

Oil of sandal wood, 376. Fifteen min. three times a day in acute and chronic gonorrhœa.

Sulpho-carbolate of zinc, 317. Twenty grs. to eight oz. of water as injection two or three times a day.

Turpentine, 373.

Zinc, 246. A grain or two of chloride in a pint of water injected hourly, often removes the disease in twenty-four to forty-eight hours if used at the commencement. Rest should be observed if possible. If the frequent injection causes pain in testicles, suspend them in hot water and foment them frequently—if notwithstanding the pain and swelling increase, use injection less often.

GOUT.

Aconite, 429. For gouty pains.

Blisters, 82. A flying blister every night in chronic or sub-acute gout.

Carbonate of lithia, 155. Five grs. to the oz. on lint applied round gouty enlargements and joints, especially if skin broken.

Carlsbad waters, 187. A system required. (See ref.)

Citrate of lithia, or of potash, 155. Used as the carbonate of lithia, when skin broken.

Cod liver oil, 292. In chronic gout.

Colchicum, 407. A drachm of the wine often removes the severest pain in an hour or two.

Useful in bronchitis, asthma, urticaria, dyspepsia, &c., occurring in gouty persons.

Collodion, 284. The contractile variety with or without iodine, painted over inflamed part in acute gout, soon relieves the pain. Too many coats must not be applied.

Iodide of potassium, 115. Especially when pain worse at night.

Iodine, 105. Painted round joints in chronic gout.

Iodoform, 345. Not if inflamed.

Oil of peppermint, 374. To be painted on painful part.

Packing, 14.

Strychnia, 553. Hypodermically for later stages of gout paralysis.

Sulphides, 94. As baths in chronic gout.

Sulphurous acid, 148. After fumigation, patient to be covered with bedclothes which have been exposed to strong fumes, this produces perspiration, sleep and relief.

Turkish baths, 32. In sub-acute and chronic gout. (See p. 21).

Veratria, 403. A strong ointment to painful joints at onset.

HAY FEVER. (*See Coryza*).

HÆMATEMESIS. (*See Hæmorrhage*).

Alum, 198. Other astringents better.

Ergot, 567. (See hæmorrhage).

Hamamelis, 305. (See hæmorrhage).

Ice, 42. To be sucked.

Iron, 201. The astringent preparations.

Lead, 212. Soluble compounds sometimes used.

Sulphuric acid, 142. Other astringents surer.

Tannin or gallic acid, 304.

Turpentine, 370. In five to ten drop doses very frequently.

HÆMATURIA.

Hamamelis, 305.

Quinia, 581. Useful in some cases of intermittent hæmaturia.

Tannin or gallic acid, 304.

Turpentine, 370. In very small doses.

HÆMOPTYSIS. (*See Hæmorrhage*).

Common salt, 183. Half a teaspoonful taken dry and repeated occasionally, till nausea induced.

Digitalis, 458. The infusion in large doses very useful.

Ergot, 567. Thirty or forty min. of the liquid ext. every three or four hours or hourly in severe cases. Ergotine should be used hypodermically in very urgent hæmorrhage, in two to 5 gr. doses.

Hammamelis. (See hæmorrhage).

Ice, 42. To be sucked.

Ipecacuanha, 400.

Iron, 206. The acetate. (See hæmorrhage).

Morphia, 538. Small doses hypodermically have been employed successfully.

Spinal hot water bag, 46. To cervical and upper dorsal vertebræ.

Sulphuric acid, 145.

Tannin or gallic acid, 304.

Turpentine, 370. In one-drachm doses every three hours.

HÆMORRHAGE.

Acids, 138. *e.g.* Diluted vinegar to leech bites, piles, cuts, &c.

Alcohol, 326. Brandy or wine when heart suddenly enfeebled by hæmorrhage.

Alum, 196. In slight hæmorrhages, as leech bites or piles, it may be dusted on after wiping dry.

——— 198. Will often check bleeding from stomach; other astringents better.

Copper, sulphate of, 244. In stick, solution, or ointment, to arrest bleeding from small vessels.

Creosote, 306. Or carbolic acid.

Digitalis, 458. The infusion best—large doses may be needed.

Ergot, 567. Most valuable for hæmoptysis, epistaxis, hæmatemesis and intestinal hæmorrhage in typhoid fever. In urgent cases ergotine should be administered hypodermically in from two to five gr. doses. In less urgent cases it may be given by the stomach.

Hamamelis, 305. In hæmoptysis, hæmatemesis, hæmaturia, epistaxis, bleeding piles, varicocele, and the oozing of blood persisting after a confinement. *Dose*, one or two minims of the tincture every two or three hours.

Ice, 42. In hæmorrhage generally, when from stomach small pieces to be swallowed.

Ipecacuanha, 400. In flooding after delivery.

Iron, 200. The sulphate and ferric chloride solid or in solution. The chloride controls bleeding from small vessels, but irritates the surface of wounds and prevents union by first intention, which carbolic acid does not.

Iron, 201. Astringent preparations in hæmorrhage of stomach.

HÆMORRHAGE—*continued.*

——— 206. In hæmorrhage from lungs and kidneys the acetate is best; add sufficient to water to make it taste but not disagreeably and let patient constantly sip this.
——— 207. Injection of perchloride in post partum hæmorrhage.
LEAD, 211. The liquor may be used to check hæmorrhage from small vessels; other astringents better.
OPIUM, 549. Tr. of opium in a large dose (one drachm) with brandy in profuse flooding after parturition.
QUINIA, 580. In passive bleeding.
SILVER, NITRATE OF, 218. Bleeding leech bites may be touched with a stick of caustic.
SPINAL HOT WATER BAG, 47. Apply to cervical and upper dorsal vertebræ for epistaxis or hæmoptysis.
SULPHURIC ACID, 142. In bleeding from stomach.
——— 145. When from lungs or womb.
TANNIN, 304. In hæmorrhage from stomach, lungs, uterus and kidneys.
TURPENTINE, 370. A drachm every three hours when from lungs, nose, uterus or bladder. If from kidneys much smaller quantities must be given.
Reported to be useful in hæmorrhagic diathesis.

HÆMORRHAGE, POST PARTUM.
ICE, 42. Pushed into uterus or rectum.
IRON, 207. Perchloride, diluted, as injection.

HÆMORRHOIDS. (*See Piles.*)

HEADACHE. (*See Sick-headache.*)
ACTEA RACEMOSA, 417. In nervous or hysterical women, especially when it occurs at the menstrual period; also in hæmorrhage from overstudy or fatigue.
AMMONIA, 167. (See Change of Life).
ARSENIC, 276. For throbbing pain in one brow.
BELLADONNA, 519. When pain over brows and in eyeballs—often due to stomach or uterine derangements—met with especially in young women. Three minims of the tincture every three hours.
BROMIDE OF POTASSIUM, 129. A large dose in nervous or sick headaches.
CAMPHOR, 368. A saturated solution in eau de Cologne rubbed on the head in headache of uterine origin.
CHLORIDE OF AMMONIUM, 182. When due to menorrhagia or amenorrhœa.
COLD AFFUSION, 28. Water poured gently over forehead, sometimes warm affusion better.
ETHER SPRAY, 44. For frontal headaches after acute illness or fatigue.
FRIEDRICHSHALL WATER, 185. A wineglassful in a breakfast-cupful of hot water in bilious sick-headache.
HOT SPONGING, 22. To face, temples and neck in influenza, catarrh, &c.
HOT WATER, 22. To feet and legs.
ICE BAG, 28, 42. To head.
IODIDE OF POTASSIUM, 115. In peculiar form of throbbing headache (see ref.).
MERCURY, 243. As blue pill for sick-headache.
MUSTARD, 383. In a hot foot bath, or as poultice or "mustard leaf" to nape of neck in various forms of headache.
PODOPHYLLUM, 412. In nervous headaches near the menstrual periods with constipation and dark stools. Purgative doses often give relief.

HEADACHE—*continued.*
TEA, 570. And coffee in headaches from nervousness or exhaustion.
VERATRUM VIRIDE, 405. Tincture in the congestive headache at the menstrual period.
ZINC, OXIDE OF, 249. In two to five grain doses for nervous headache. Bismuth also useful.

HEART. *Diseases of.*
ARSENIC, 274. For breathlessness or angina from weakly-acting heart.
ACONITE, 426. When violent throbbing and extreme pain in pericarditis.
ALCOHOL, 326. Brandy or wine when heart suddenly enfeebled by fright, loss of blood, accidents, &c.
BLISTERS, 78. Flying, over præcordial region to stimulate the action of the heart in extreme weakness.
COD LIVER OIL, 291. In chronic inflammation.
——— 292. With quinine, for giddiness due to weak heart in the aged.
DIGITALIS, 439. Of eminent service where dropsy, dyspnœa, livid face, frequent irregular pulse and dilatation of left ventricle. The freshly made infusion best. These cases require alcohol—gin best.
——— 441. Where much dilatation and hypertrophy of left ventricle without valvular disease. It is not contra-indicated when aortic disease.
——— 442. Where though the heart beats tumultuously and strongly the pulse is weak and dyspnœa great.
——— 449. Irregularity of pulse best indication for digitalis. A slight palpitation much increased by catching cold often cured by digitalis—sometimes aconite better. Da Costa strongly recommends digitalis for "irritable heart." (See ref.)
——— 451. Very useful in pure hypertrophy due to valvular disease or excessive muscular exertion. Also in aortic regurgitant disease when compensatory hypertrophy excessive. Two to five minims of the tincture enough—aconite often better.
ELATERIUM, 600. In dropsy. Caution needful.
MORPHIA, 537. Hypodermically for dyspnœa of disease of heart and large vessels and of intrathoracic tumours. More useful in mitral than in aortic disease.
MUSTARD, 383. Foot-bath, or mustard leaf to neck.
NITRITE OF AMYL, 362. In cardiac dyspnœa due to hypertrophied and dilated heart; also in syncope.
POULTICES, 36. Large, hot, and frequently renewed, in pericarditis.
PURGING, 604. With jalap, &c., in engorgement of right side of heart from emphysema and bronchitis, mitral obstructive or regurgitant disease. Where severe headache and pain at epigastrium, bleeding gives instant ease.
In persistent tricuspid regurgitation from permanent distension of the right heart; purgatives only useful when an attack of bronchitis causes an exacerbation.
STRYCHNIA, 501. In medicinal doses it is said to strengthen the heart-beats.
VERATRIA, 403. As ointment to chest when rapid irregular pulse, hurried breathing, much lividity and dropsy, palpitation and inability to lie down.

HEARTBURN (*See Stomach, Diseases of*).

HERNIA.

Chloroform, 341. Inhalation to assist reduction.

HERPES.

Acetic acid, 137. Applied to a patch of herpes circinnatus to cut it short.
Blisters, 81. For obstinate neuralgia following shingles.
Collodion, 284. Painted over patches before vesicles developed, but inferior to nitrate of silver.
Hot fomentations, 35. Will often disperse or restrict development of herpes labialis.
Iodine, 106. Liniment once applied enough for herpes circinnatus.
Morphia, oleate of, 228. Locally without friction in herpes zoster.
Nitrate of silver, 218. To be painted on the warning patch of erythema, before or as soon as the vesicles begin to form.
Veratria, 403. The ointment, one scruple to two scruples to the ounce in neuralgia following shingles.

HICCUP.

Camphor, 369.
Chloroform, 332. Often combined with opium.
Morphia, 538. Hypodermically, often arrests persistent hiccup.
Mustard, 384. A drachm infused in four ounces of boiling water has cured most obstinate cases.

HOARSENESS.

Alum, 198. Ten grains to one ounce of water in chronic coughs and hoarseness as spray.
Borax, 156. A piece the size of a pea allowed to dissolve in the mouth.
Glycerine of tannin, 302. Locally in chronic inflammation of the throat.
Ipecacuanha wine, 398. As spray, when congestion of vocal cords.
Sulphurous acid, 147. Inhalation, spray, or fumigation, in clergyman's hoarseness.
Turkish bath, 30. At commencement of a feverish cold will often cut it short, together with the accompanying hoarseness.

HORDEOLUM.

Mercury and morphia, oleate of, 227. The 20 per cent. ointment with lard outside the eyelid.

HYDROCEPHALUS.

Croton oil, 297. Said to remove fluid from ventricles.

HYDROCELE.

Iodine, 106. Tincture, to inject into cavity after paracentesis.

HYPERÆSTHESIA.

Bromide of potassium, 132.

HYPOCHONDRIASIS.

Bromide of potassium, 128. Where great despondency amongst male but especially amongst female subjects who live in towns.

HYSTERIA.

Aconite, 429. For "fluttering of the heart" in nervous persons.
Actæa, 417. For headache.
Alcohol, 324. With plenty of volatile ether;—care must be taken that it does not lead to tippling.
Assafœtida, 379.
Bromide of potassium, 131. Gives control and prevents paroxysms. When verging on nymphomania large doses required.
Cannabis indica, 566. In some cases.
Chloroform, 332. Often combined with opium.
Cod liver oil, 292. In middle aged people with dyspepsia or "craving" at epigastrium.
Iron, 205. A course often useful, especially when anæmia or uterine obstructions.
Musk, 318. Has been given.
Nux vomica, 559. The tincture, especially when combined with small quantities of laudanum, of great use in the so-called hysteria of middle-aged people, with flatulence, weight on head, flushings and hot and cold perspirations.
Opium, 549. A drop of laudanum with two of the tr. of nux vomica three or four times a day for weight on head with flushings, perspirations, depression, &c.
Phosphorous, 283. In hysterical paralysis.
Valerianate of zinc, 377. Especially at the change of life.
Volatile oils, 375.
Zinc, 249. Especially the valerianate in some forms of hysteria.

ICHTHYOSIS.

Warm bath, 21.

IMPETIGO.

Glycerine of tannin, 301.
Oils, 286. To facilitate removal of scabs.
Poultices, 301. At night, to remove scabs.
Quinia, 580.
Sulphate of copper, 244.
Sulphur, 94. Internally.
Zinc, 247. The ointment of the oxide after inflammation subsided, when raw surface indolent; oxide and carbonate used as dusting powders, but greasy applications generally better.

IMPOTENCE.

Cantharides, 382. In large doses (twenty or thirty drops of the tinct. or half a grain of the powder) with iron and phosphoric acid or nux vomica.
Strychnia, 559. Sometimes useful in large doses, when spermatorrhœa.

INCONTINENCE OF URINE.

Belladonna, 520. The best remedy for children—ten to twenty drops of the tinct. three times a day. If unsuccessful, and no worms or other irritation exist, try strychnia, cantharides, turpentine, santonine or galvanism.
N.B. The child should drink but little some hours before going to bed, and should be waked in the middle of the night to pass water.
Cantharides, 381. One or two drops of the tinct. three or four times a day in middle-aged women or the aged, even when due to paralysis; sometimes also in children, but for them belladonna is generally better.
Choral, 350. In children.
Collodion, 285. Painted to form a cap over end of prepuce.

INCONTINENCE OF URINE—*continued.*
Ergot, 569. Said to be useful.
Iron, 206. Sometimes useful even when no worms.
Nitrate of potash, 193. Has been recommended for children.
Strychnia, 559. Sometimes useful for old people with paralysis of the bladder; also for the incontinence of children.

INDIGESTION. (*See Dyspepsia*).

INFLAMMATION.
Aconite, 422, 429. Gives most brilliant results when inflammation not very extensive or severe, as in catarrh of children, tonsillitis and acute sore throat. In the graver inflammations, as pneumonia, pleurisy, &c., the effects are equally manifest though less rapid. In pericarditis, with violent throbbing and extreme pain, aconite will quiet the undue action and relieve the pain. It has a beneficial influence in acute specific fevers; it is of marked service in erysipelas and the inflammation sometimes following vaccination. It is also of use in acute rheumatism, otitis and gonorrhœa.
Antimony, 252. Should be given at the beginning a quarter to half a grain every two or three hours, or a lesser proportionate dose every hour; useful in tonsillitis, pleurisy, orchitis, bronchitis, puerperal peritonitis, inflammation of breast, whitlow, &c.
Atropia, 507. In inflammations of eye.
Belladonna, 506.
Cod liver oil, 290. In many chronic inflammations, as of the heart, lungs and kidneys.
Digitalis, 457. Large doses asserted to be capable of subduing acute inflammations, if used at the commencement. (Aconite much safer and better).
Fomentations of a small teaspoonful of the leaves in half a pint of boiling water, said to be valuable for acute inflammation of joints and of the breast, and for erysipelas.
Fomentations, 35.
Ice, 42. In very small pieces in a bladder applied to inflamed part.
Iodine, 105. The liniment in the neighbourhood of local inflammation so as to produce vesication.
Mercury, 243. Bichloride in iritis and inflammations of deep-seated parts of eye and in other inflammations, especially those of serous membranes.
Nitrates, 193. Opinions concerning the efficacy of these in acute inflammation discrepant.
Opium, 535-539. Poultices containing laudanum allay pain in superficial and deep-seated inflammation. Morphia injections sometimes needed in pleurisy, pneumonia, &c. An extract of opium has been recommended as a local application for carbuncles and boils (see p. 481). Opium wine of the 1864 Pharmacopœia, which contains no spices, is very useful in the pain of conjunctivitis dropped into the eye. Opium mixed with tannin or creosote may be introduced into the hollow of a painful tooth if the pain is produced by inflammation of exposed pulp.
Packing, 13. In acute inflammatory diseases.
Poultices, 35. To check formation of pus or assist in maturation.
Sulphides, 97. In boils, abscesses, and d[illegible] seated suppuration.

INFLUENZA.
Actæa racemosa, 415. Has been given, it is said, with much success.
Hot sponging, 22. For headache.
Sulphurous acid, 147. Fumigation or inhalation. (See ref.)

INGROWING TOENAIL.
Liquor potassæ, 154. Diluted, constantly applied on cotton wool.

INSOMNIA. (*See Sleeplessness*).

INTERMITTENT FEVER. (*See Ague.*)

INTERTRIGO.
Bismuth, 208. Nitrate or carbonate, as dusting powder.
Camphor, 367. As addition to dusting powders, to allay heat and itching.
Carbonate of lime, 173. Or oxide of zinc or bismuth sometimes useful as dusting powder. More often greasy applications better.
Glycerine of tannin, 302. Sometimes useful.
Soap, 153. Free ablution with, when caused by acid secretions, smear afterwards with greasy application.
Lime water, 175. To prevent irritating urine.

IRRITABILITY.
Chloral, 350. Five grains two or three times a day in irritability with nervousness and restlessness.

IRITIS. (*See Eyes, Diseases of.*)

ITCH.
Alkalies, 151. As soap or ointment to remove cuticle and break up burrows.
Baking of clothes, 147. Must not be forgotten.
Iodide of potassium, 110. As ointment.
Storax, 91 and 374.
Sulphur, 89. Ung. sulph. after bath. (See p. 90).
Sulphur and lime, 95.
Sulphurous acid, 147. As gaseous bath. This is the quickest method.
Warm baths, 38.

ITCHING. (*See Pruritus*).

JAUNDICE. (*See Liver, Diseases of*).
Mercury, 235. In attacks of jaundice lasting three or four days accompanied by depression and preceded by sickness and coated tongue, one-sixth or one-third of a grain of grey powder taken at the onset and repeated three or four times a day very valuable. If obstinate constipation, a course of Carlsbad waters sometimes more efficacious.

JOINTS, DISEASES OF.
Arsenic, 277. Often serviceable in rheumatoid arthritis, and nodosity of joints. Large doses long continued necessary. Action capricious, sometimes useless, at others remarkably good.
Aconite, 429. For pains in inflamed joints.
Cod liver oil, 291. When strumous.
Cold douche, 28. For stiffness.
[illegible], 456. As fomentations. (See Inflam-

JOINTS, DISEASES OF—*continued.*

Galvanism, 33. For stiffness.
Iodine, 106. Solution injected into white swellings.
Mercury, 226—229. Locally applied, as Scott's ointment, in chronic inflammation of knee—better still as oleate of mercury.
Turkish bath, 33. For stiffness.

KIDNEYS, EXCESSIVE ACTION OF.

Spinal ice bag, 45.

LACTATION, EXCESSIVE.

Alcohol, 329. As stout often useful—not always.
Belladonna, 500. Internally or externally or both.
Quinia, 580. Has been recommended.
Tannin or gallic acid, 257. Employed by some.
Tobacco, 460. With lard externally said to arrest secretion of milk.

LARYNGISMUS STRIDULUS.

Bromide of potassium, 122. When uncomplicated except with convulsions.
Cod liver oil, 292.
Cold sponging, 23. Twice or thrice daily—sometimes immediately successful—prevents convulsions. Take care no laryngitis.
Cold water dashed in face, 24. Often arrests paroxysm.
Lancing gums, 24. If swollen, red and hot, may require repetition.
Lobelia, 564. Has been employed.
Spinal ice bag, 45.
Worms, removal of, 24. Treat faulty state of mucous membrane.

LARYNGITIS.

Aconite, 424. In spasmodic laryngitis or catarrhal croup very valuable.
Silver, nitrate of, 221. Powdered or in solution to chronically inflamed larnyx, as in phthisis.
Sulphurous acid, 147. Inhalation, spray, or fumigation.

LEAD POISONING. (*See Poisoning*).

LEUCORRHŒA.

Alkalies, 135. A weak injection when excessive secretion from glands of os.
Alum, 200. A drachm to a pint of water as injection. (See p. 153).
Belladonna, 506. With tannin as bolus where neuralgia or ulceration of os.
When disease due to over secretion of mucous glands about the os and much pain present, inject sodæ bicarb. one drachm, tinct. bellad. two ounces, aq. one pint. (See ref.)
Bicarbonate of potash or soda, 153. One drachm to a pint of water as an injection especially when discharge alkaline and copious. (See ref.).
Carbolic acid, 270. Diluted as injection for vaginal leucorrhœa.
Cold sponging, 25.
Copper, 245. Solutions of the sulphate as injections.
Ergot, 569. Said to be useful in some cases.
Iron, 206. Internally.
Lead, 212. As injections.
Lime water, 174. As injection.
Phosphate of lime, 178.
Spinal ice bag, 45.

LEUCORRHŒA—*continued.*

Tannin, 304. As injection. If os ulcerated a suppository of tannin and cocoa nut fat to mouth of uterus.
Vaginal injections, 29. Water at 60 degrees F. to prevent recurrence.
Zinc, sulphate of, 247. Sometimes added to alum injections.

LEAD COLIC (*See Poisoning by Lead*).

LEPRA (*See Psoriasis*).

LICE.

Essential oils, 374. (For formulæ, see ref.)
Mercury, 224. Nitrate of mercury ointment or corrosive sublimate wash for lice on all parts of the body.
The body louse may be killed by essential oils, as rosemary, or by powdered pyrethrum, or by ointment of staphisagria. The under linen should always be boiled.
———— 227. The oleate destroys lice immediately, and simultaneously kills the ova.
Staphisagria, 414. As oil or ointment of the powder.

LICHEN.

Alkalies, 151. (See Pruritus).
Arsenic, 275. Sometimes useful.
Cantharides, 380. Internally.
Chloroform, 330. As ointment to allay itching.
Cyanide of potassium, 533. Or hydrocyanic acid. (See Itching).
Mercury, 225. Calomel and nitrate of merc. oint. may be mixed, and tar oint. is sometimes added in patches of obestinate lichen, especially of the hands, even when not syphilitic.
Nitrate of silver, 21-. The nitrous ether solution to be painted every day or second day on a patch of lichen the size of the palm with excessive irritation.
Sulphides, 94. As baths.
Warm baths, 21.

LIVER, DISEASES OF.

Nitric acid, 143. In long standing diseases, as congestion and cirrhosis, will augment flow of bile after liver has struck work from excessive use of mercury.
Sulphates, 188. In purgative natural waters—small doses oft repeated—sulphate of potash occasionally poisonous.

LOCOMOTOR ATAXY.

Calabar bean, 478. Has proved very beneficial.

LOINS, PAINS IN.

Lead, 211. As plaster, when pain due to weakness, better than a pitch plaster.
Also useful when pain due to uterine disease or piles.

LUMBAGO.

Acupuncture, 56. Succeeds best when loin muscles of both sides affected, pain being most severe on to and fro movement. Needle to be run an inch or more over seat of greatest pain on each side. Sometimes on withdrawal cure is

Lumbago—*continued.*

complete. When sciatica associated with it, lumbago hard to cure. Acupuncture useless when high fever or when acute rheumatism is commencing.
Actæa racemosa, 415. Said to subdue lumbago more effectually than any other remedy.
Belladonna, 500. As plaster very valuable for persistent remains affecting a small spot.
Capsicum, 385. A strong infusion applied on lint.
Ether spray, 43, 56. Locally applied as freezing mixture.
Faradization, 56. Almost as successful as acupuncture.
Galvanism, 37, 44. Highly useful.
Hot flat iron, 56. The back to be ironed, a piece of brown paper intervening.
Ice and salt, 43, 56. Locally applied as freezing mixture.
Iodide of potassium, 115.
Morphia, 536. Hypodermically injected, often successful at once.
Nitrate of potash, 193. Ten grains hourly or every two hours when urine scanty and high coloured, becoming turbid on cooling.
Plaster of lead or pitch, 57. Applied after cure effected.
Poultices, 37. Very hot. Should be continued for three hours, then the skin covered with flannel and oiled silk.
Thermic hammer, 56.
Turkish bath, 33.
Turpentine, 373. In twenty-drop doses.
Veratrum viride, 405. As tincture, said to be useful.

Lungs, hypostatic congestion of.

Blisters, 350. Flying blisters to chest and perhaps along pneumogastric nerves.

Lupus.

Arsenic, 256. Arsenous acid as a caustic.
Blisters, 82. In erythematous lupus.
Iodine, 105. As tincture or liniment to edges and around.
Lead, 211. Liq. plumbi with one or two parts glycerine, applied warm after crusts removed in milder forms.
Mercury, 229. Ointments in erythematous lupus—calomel oint. in scrofulous and tubercular lupus of children.
Acid nitrate for touching summit of tubercle, if application painful, cover spot with collodion.
Silver, nitrate of, 219. A weak solution gradually strengthened in superficial kinds of lupus.
Zinc, 246. Cloride, iodide and nitrate locally.

Malaria

Quinia, 576. And allied alkaloids (See Ague), also for neuralgia dependent on malarial poison.
Turkish bath, 31. The cautious use of, for those suffering from various diseases caused by long residence in a tropical climate.

Mammary abscess.

Belladonna, 500. (See Breasts, inflammation of).
Mercury and morphia, oleate of, 227. Locally.
Sulphide of calcium, 97. Internally—occasionally the pain is temporarily increased.
Tobacco, 460. The leaves as a poultice.

Mania, acute.

Actæa, 417. After confinement or during pregnancy.
Bromide of potassium, 128.
Cannabis indica, 566. A drachm of the tinct. with a drachm of bromide of potassium.
Chloral, 349. In acute and puerperal mania.
Conium, 469. The juice.
Cold douche, 28. In maniacal delirium—place patient in a warm bath during the application.
Croton oil, 297. As a purgative—a quarter or third of a minim every hour.
Hyoscyamus, 529. To produce sleep and calm violent delirium.
Hyoscyamia, 529. In violent intermittent forms.
Morphia, 537. Hypodermically to induce sleep.
Opium, 547. Many cases may be satisfactorily treated with opium and tartar emetic.

Measles.

Aconite, 427. To moderate the catarrh and bronchitis.
Carbonate of ammonia, 170. In three or five grain doses, every two or three hours.
Cold affusion, 26. At commencement.
Fat, 286. Hands and feet to be rubbed with a firm fat to remove heat and tightness produced by rash.
Mustard, 383. As bath on sudden retrocession of rash.
Packing, 303. Especially on retrocession of rash.
Purgatives, 188. Must be given with caution.
Veratrum viride, 404. Has been employed.

Megrim ard Megraine (*See Sick Headache*).

Melancholia.

Bromide of potassium, 128. For townspeople, especially women, with unendurable despondency.
Camphor, 369.
Musk, 318. Also castoreum.

Meningitis.

Antimony, 249. Tartar emetic ointment as counter-irritant to scalp in tubercular meningitis.
Bromide of potassium, 127. In the convulsions after simple meningitis.
Croton oil, 297. Internally in hydrocephalus supposed to remove excess of fluid.
Ice, 42. In a bag as a cap.

Menorrhagia.

Actæa, 417. For headache accompanying profuse menstruation.
Bromide of potassium, 131. Most useful in young women; if loss only at natural period commence bromide a week before, and discontinue when it has ceased till a week before next time.
If loss occur every two or three weeks, give bromide continuously—ten grs. dose, but more when organic changes in womb.
Cannabis indica, 567. Very useful.
Chloride of ammonium, 182. For headaches.
Digitalis, 458. Permanently efficacious when no organic disease, often temporarily so when there is.
Ergot, 568. Of great use in all forms, even when the hæmorrhage proceeds from tumours.

MENORRHAGIA—*continued.*

Oil of cinnamon, 375. Drachm doses.
Phosphate of lime, 178. In anæmia from excessive menstruation.
Quinia, 580. Has been recommended.
Savine, 378. When due to want of tone in the uterus.
Spinal hot water bag, 47. To lower dorsal and lumbar vertebræ.
Tannin and gallic acid, 304.

MENSTRUATION, DISORDERS OF (*See Amenorrhœa and Menorrhagia*).

MICTURITION, FREQUENT.

Cantharides, 381. In women who micturate too frequently or involuntarily on coughing, from weakness of sphincter. One or two drop doses.

MICTURITION, PAINFUL.

Alkalies, 159. When caused by uric acid in spicular crystals in young male children. The citrates are best suited for this.
Camphor, 369.
Cannabis indica, 566. Said to relieve dysuria and strangury.
Cantharides, 381. A drop of the tincture (sometimes five required) three times a day for frequent desire to micturate with pain.

MOSQUITOES.

Carbolic acid, 317. A weak solution sponged over the body to keep off mosquitoes.

MOUTH, DISEASES OF (*See Stomatitis*).

Arsenic, 257. In a peculiar circular rash on the tongue, usually in children associated with stomach or intestinal disturbance, or a body rash; also in sloughing of the mouth or throat, cancrum oris, &c.
Chlorate of potash, 194. In ulceration of gums and the parts of the tongue and cheek in contact with this.
In follicular and phagedenic ulceration.
Chlorine solution, 104. In ulceration.
Creosote, 313. Or carbolic acid gargle or wash in sloughing.
Lime water, 174. In inflammatory and ulcerative diseases.
Salicylic acid, 597. One part (dissolved in alcohol) to 250 of water in catarrhal stomatitis and thrush.
Silver, nitrate of, 220. Applied to ulcers of mouth.
Sulphate of copper, 244. Applied solid to indolent sores of tongue.
Solution painted over edges of gums in ulcerative stomatitis, but generally dried alum is better.

MUCOUS MEMBRANE, DISEASES OF.

Nitric acid, 138. When reddened, inflamed and glazed.

MUCOUS TUBERCLES (*See Syphilis*).

MUMPS.

Mercury, 233. The third of a grain of grey powder three or four times a day very useful, relieving pain and swelling.

MUSCULAR RIGIDITY.

Spinal ice bag, 45. If due to disorder of nervous centres.

MUSCLES, ACHING OF, FROM EXERTION.

Arnica, 15.
Dripping wet sheet, 14. Well rub afterwards.
Turkish bath, 29.
Actæa, 415. In a general "bruised sensation."

MYALGIA.

Belladonna, 499. Often successful as liniment, though sometimes an opium liniment better.
Chloride of ammonium, 182.
Ether, 37. As spray.
Iodine, 105. The ointment for pain in the muscles of the chest, these being tender on pressure but the skin may be pinched without pain.
Opium, 535. Poultices or frictions with laudanum.
Poultices, 37. Very hot, followed by application of lint and oilskin.

NÆVUS.

Zinc, 246. Chloride, iodide, and nitrate locally.

NERVOUS HEADACHE (*See Sick Headache.*)

NERVOUSNESS.

Bromide of potassium, 129. Especially for women who are despondent, irritable and sleepless, from overwork, grief, worry, &c., often connected with migraine.
Chloral, 350. When restlessness and debility.
Chloroform, 331. As spirits of chloroform internally.
Cold sponging, 25. When from close rooms, &c.

NETTLE RASH. (*See Urticaria.*)

NEURALGIA.

Aconite, 418. As ointment or liniment, especially when fifth nerve affected, also in neuralgic sick headache—sometimes veratria better. Spinal irritation and intercostal neuralgia generally yield better to belladonna preparations.
Alcohol, 324. With much volatile ether—care must be taken in prescribing it.
Arsenic, 276. In various neuralgias, also in angina pectoris.
Atropia, 507. Hypodermically—generally morphia better.
——— 518. Trousseau's method—give one-fifth gr. extr. bell. every hour till giddiness induced, then lessen dose, but continue the medicine for several days.
Belladonna, 499 and 517. The liniment or the ointment of atropia sometimes useful in facial neuralgia.
Bromide of potassium, 131. Occasionally relieves.
Cannabis indica, 566. Has been found useful.

NEURALGIA—*continued.*

Capsicum, 385. A strong infusion on lint covered with gutta percha.

Carbonic acid gas, 88. Injected into vagina for neuralgia of uterus.

Chamomile, 599. In neuralgia of the fifth nerve.

Chloral, 351. Sometimes relieves.

Rubbed with an equal weight of camphor and painted on painful part or gently rubbed in, often useful in neuralgia, pleurodynia, and toothache.

Chlorate of potash, 195. Has been recommended in facial neuralgia.

Chloride of ammonium, 182. In half-drachm doses in facial neuralgia, much used also for all neuralgias.

Chloroform, 330. Occasionally useful locally. As spray for neuralgia of uterus. Two or three drops on cotton wool in ear for face-ache and toothache.

———— 341. Inhalation.

Conium, 469. Internally.

Counter-irritation, 80. A blister to temple or behind the ear of the greatest service in frontal and facial neuralgia—that depending on a diseased tooth often yields to a blister, also the migratory neuralgic pains in nervous women and intercostal neuralgia left by shingles. Blisters should be applied, according to Anstie, to a posterior branch of the spinal nerve-trunk from which the painful nerve issues.

If blistering paper does not succeed in neuralgia a strongerpreparation to be tried.

Croton-chloral, 352. Five grain doses, especially in facial neuralgia, in that due to carious teeth, in that of the neck and back of head, in dysmenorrhœal neuralgia, and in epileptiform tic.

Ergot, 567. Said to be useful.

Ether, 343. As spray sometimes relieves permanently, often only temporarily.

Gelseminum, 487, 498. In neuralgia of dental branches of the fifth.

Hydrocyanic acid, 533. And cyanide of potassium formerly employed locally.

Hyoscyamus, 529.

Iodoform, 345. As saturated solution in chloroform locally.

Iron, 205. When associated with anæmia, but no organic cause. Moderate doses only required.

Morphia, oleate of, 228. One or two grains to a drachm, locally.

Nitrate of amyl, 362. Inhalation when fifth nerve affected.

Oil of peppermint, 374. To be painted over the part in facial neuralgia.

Opium, 535. The liniment rubbed in or a hypodermic injection of morphia—sometimes a single injection will cure old standing cases, if not it may be repeated every second day or so for some time.

Phosphorus, 282. From 1-100th to 1-12th grain every three hours. Very useful in all forms of neuralgia, especially when uncomplicated.

Quinia, 578. In periodical neuralgia, whether malarial, or not, large doses should be given just before the expected attack.

Useful also in small frequently repeated doses in other neuralgias, especially of the supra-orbital nerve.

Spinal ice bag, 45.

Stramonium, 532. Has been used.

Valerianate of zinc, 378. Or of ammonia in neuralgia of face or head.

Veratria, 402. An ointment of the pharmacopœial strength enough for the face, but stronger ones necessary for sciatica and other neuralgias, also for the pain consequent on shingles.

———— 405. Tinct. of veratrum viride said to be useful.

NIGHTMARE.

Bromide of potassium, 131.

NIGHT SCREAMING.

Bromide of potassium, 130. In children's attacks of night screaming often associated with squinting. Digestive organs to be attended to also.

NIPPLES, SORE.

Arnica, 283. The cerate.

Brandy and water, 173. To be used as lotion before delivery and after each sucking to prevent cracking. Nipples should be washed and dried immediately after child is removed. (See p. 319.)

Collodion, 283. Sometimes applied to chapped nipples.

Glycerine, 283. Of starch or with eau de Cologne.

Lime water, 173. As lotion.

Sulphurous acid, 147. Solution neat or diluted, constantly applied.

———— 283. With equal quantity of glycerine as lotion.

Zinc shield, 173. Constantly worn.

NODES.

Iodide of potassium, 109, 113. As ointment in conjunction with internal use.

Mercury, oleate of, 227. Externally very valuable.

NOSE, DISEASES OF.

Ammonia, 168. Inhalations, in pain and inflammation of nose and frontal bones.

Glycerine of tannin, 300. For brushing out inside of nose when excoriated after measles, scarlatina, &c. Also for impetiginous eruptions of inside of nose, most severe where hair grows—epilation sometimes needful. Glycerine of starch or zinc ointment applied often is a good supplementary application.

———— 301. In the discharge of greenish black stinking mucus.

Cod liver oil, 291. For chronic discharge.

NUTRITION, IMPAIRED.

Lime, 176. As lime water or carbonate of lime. Small doses as good as large.

Cod liver oil, 292. Especially in children.

NYMPHOMANIA.

Bromide of potassium, 131. Large doses required, at least 20 grs. three times a day.

Camphor, 369.

OBESITY.

Alkalies, 158. Solutions of oxides or bicarbonates. Use very questionable.

———— 159. Liquor potassæ. This usually however fails.

Vinegar, 142. A remedy to be strongly condemned as it only reduces obesity at the expense of serious injury to the body.

ŒSOPHAGUS, STRICTURE OF.

Nutritive enemata, 54. When swallowing impossible. For directions see ref.

OPIUM, DISAGREEABLE SYMPTOMS OF.

Bromide of potassium, 132. Lessens giddiness, confusion, fainting, headache, and sickness. 20 grs. or more an hour before the opium and 20 grs. two hours after.

OPHTHALMIA.

Alum, 196. Eight grains to one ounce applied every *quarter* or half hour in simple and especially in purulent ophthalmia of children.
Antimony, 254. As tartar-emetic 1-36th to 1-48th grain three or four times a day in strumous ophthalmia. Sharp purgation at commencement useful.
Carbonic acid gas, 88. Said to relieve pain and photophobia of scrofulous ophthalmia when applied to the eye.
Cod liver oil, 291. When strumous.

ORCHITIS.

Antimony, 252. As tartar-emetic in acute orchitis. (See Inflammation).
Ice locally applied, 42. Also in neuralgia of the testis.

OTITIS. (*See Ear, Diseases of, and Otorrhœa.*)

OTORRHŒA.

Aconite, 429. In otitis.
Alum, 196. Strong solution (sixty grains to one ounce) but inferior to glycerine of tannic acid.
Glycerine of tannin, 301. Meatus to be filled and plugged with cotton wool—not in acute inflammation of meatus.
Cod liver oil, 291. When chronic.
Lead, 211. Solutions of acetate or diacetate as injection, especially when acute stage just subsided—in later stages stronger astringents needed.
Lime water, 174. As a wash when active inflammation present. In chronic cases far inferior to astringents such as glycerine of tannin.

OVARIAN TUMOURS.

Iodine, 107. Ten oz. of tincture injected after tapping.

OXALURIA.

Mineral acids, 141. When eructations of sulphuretted hydrogen.

ONYCHIA. (*See Paronychia*).

OVERWORK.

Bromide of potassium, 128. When insomnia, bad dreams and irritability.
Opium, 549. A drop of laudanum with two of tinct. nucis vom. three or four times a day for headaches with flushings and dyspepsia.
Phosphate of Lime, 177. May be combined with phosphate of iron and carbonate of lime. A grain of each for a dose.
Phosphorus, 282. In depression from overwork.
Sea bathing, 12.

OZŒNA.

Acetate of alumina, 198. Irrigation.
Alum, 197. Nose to be well irrigated with a solution, a drachm to a pint.
Bismuth, 208. With equal quantity of Venetian calc in chronic non-syphilitic ozœna to be snuffed up after clearing the nose by strongly blowing it. Mercurial powders better.
Carbolic acid, 312. A weak solution as injection.
Glycerine of tannin, 198. Irrigation.
Mercury, 231. White or red precipitate with 58 times its weight of sugar snuffed up after clearing the nose in the non-syphilitic form.
—— 232. Ointment of the nitrate in syphilitic form. (See "Syphilis").
Tannin, 300. Or glycerine of tannin, even if syphilitic.

PAIN. (*See Neuralgia, Colic, etc.*)

Atropia, 507. Hypodermically in local pain, in neuralgia, sciatica, glaucoma, &c. When it succeeds, effects more lasting than those of morphia.
Belladonna, 517. Best remedy for every kind of pain in pelvic viscera (Anstie).
Bichloride of methylene, 343. Inhalation produces general anæsthesia.
Carbolic acid, 306. As local anæsthetic.
Chloral, 348, 351. Sometimes relieves neuralgia, chronic rheumatism, gall stones, colic, gastralgia, and even cancer.
Chloroform, 329. Locally; generally inferior to other anæsthetics.
———— 330. Two or three drops on cotton wool introduced into the ear for faceache or toothache.
Vapour on raw surface of cancers, neuralgia of uterus, a photophobic eye, etc.
———— 333. As vapour to produce general anæsthesia. (See ref. for full directions).
———— 340. Inhalation in renal and biliary colic.
Conium, 469. In cancer, rheumatism, neuralgia, &c.
Ether, 341. As spray for local anæsthesia, also inhalation to produce general anæsthesia. (See ref.)
Iodoform, 344. A suppository in painful diseases of rectum and bladder.
Opium, 535–537. Poultices containing laudanum used in inflammation. Linim. opii rubbed in relieves neuralgias, pleurodynia and myalgia; preparations of opium or morphia are applied to irritable, cancerous and simple sores.
The hypodermic injection of morphia extensively employed to relieve pain. The unpleasant symptoms often accompanying its administration may usually be obviated by combining it with a twentieth part of atropia. At first not more than a sixth of a grain of morphia should be injected. A single injection sometimes cures recent and even longstanding sciatica and neuralgia. Useful in lumbago, pleurodynia and toothache. Occasionally required in pleurisy or pneumonia if the suffering is severe or persistent. Valuable in renal, biliary and intestinal colic.
——— 542. An injection of laudanum and starch useful in pain of bowels or organs near the rectum, such as cystitis or uterine diseases; opium and gall ointment excellent for painful bleeding piles and fissures of anus.
——— 548. In chronic cases it is best to try first all other methods of easing pain, as an opiate soon loses its influence.
Stramonium, 532. As ointment.
Warm injections, 53. Soothe the pain of cystitis, prostatitis, abscess of the prostate and pelvic, and abdominal pains generally.

Palpitation.
- Aconite, 429
- Camphor, 369. In nervous palpitation.
- Hot foot bath, 22.

Paralysis.
- Belladonna, 516. When depending on chronic inflammation of the cord. Brown Séquard gave ergot internally, applying belladonna as plaster or ointment along the spine.
- Calabar bean, 477. In general paralysis of insane, also in progressive muscular wasting without much mental disorder. Also in some cases of long standing hemiplegia; sometimes in paraplegia, locomotor ataxy, and writer's cramp.
- Cannabis indica, 566. For retention of urine from spinal disease.
- Counter-irritation, 82. By blistering fluid in peripheral paralysis of 7th nerve.
- Ergot, 569. Said to be useful in paraplegia.
- Nux vomica, 558. Or strychnia recommended by Brown Séquard in paraplegia from softening and wasting of cord. Often useful in motor paralysis,
- Phosphorus, 283. In hysterical paralysis.
- Strychnia, 553. In all forms (except according to Barwell in cerebral and spinal paralysis). (See ref.) Dose recommended from 1–80th to 1–12th grain.

Paronychia.
- Mercury,, 226. As ointment applied for ten minutes every hour. Poultices at other times.
- Nitrate of lead, 226. Dusted on diseased tissues night and morning.

Parturition. (*See Confinement.*)

Pediculi. (*See Lice.*)

Pemphigus.
- Arsenic, 275. Largest dose five min. liq. arsenicalis three times a day not on empty stomach. (See ref.)

Pericarditis. (*See Heart, Diseases of*).

Periosotitis. (*See Nodes.*)
- Iodide of potassium, 113. In syphilitic children; also in non-syphilitic periosteal thickenings.
- Mercury and morphia, oleate of, 227 Locally.

Peritonitis. (*See also Puerperal Peritonitis*).
- Opium, 542. To quiet intestinal movements.
- Poultices, 36. Large, hot and frequently renewed. Should be thin and covered with cotton wool.

Perspiration, excessive.
- Atropia, 502. In sweating of phthisis and exhausting diseases. See Phthisis.
- Belladonna, 500. As liniment locally to affected part, also tincture internally especially in weakly children who perspire profusely.
- Ergot, 569. Said to arrest sweating.

Perspiration, excessiv
- Lead, 211. As ointment of equ
  plumb. and linseed oil sprea
  wrapped round the feet whe
  be renewed every third day for
- Oils, 286. Rubbed into the wh
  vent sweating accompanying
  seases as phthisis; but spongi
  acid wash better.
- Opium, 549. As Dover's powd
  after zinc has failed.
- Quinia, 580. In exhausting dis
  phthisis. If a small dose fail, o
  grs. at once or in portions repe
  In many cases a night dra
  sulphate of zinc and sulphuric
- Spinal ice bag, 45.
- Sponging with acidulated wat
- Sponging, very hot, 22. In pht
- Tannin or gallic acid, 304.
- Zinc, oxide of, 249. In two-gra
  to control profuse colliquative

Pharyngitis. (*See Thr*

Phlebitis.
- A blister, 80. Over course of
  ficial vein.

Phlegmasia dolens.
- Hamamelis, 306.

Photophobia. (*See E*
of, also Conjunctivitis

Phthisis.
- Alcohol, 329. Brandy and milk b
- Arsenic, 257. As cigarettes—ca
  (See ref.)
- ——— 270. Useful in the diar
- ——— 276. Probably diminish
- Atropia, 502. 1–200th to 1–10
  cally or 1–70th to 1–50th or eve
  cases, 1–20th in pill, to check e
  ration.
- Belladonna, 499. Liniment or
  perrentiveness of the muscles o
- Benzoin, 374. One drachm of
  in boiling water as inhalation
  and expectoration in chronic p
- Blisters, 80. In chronic or fibro
- Brandy, 329. Or rum and mil
  fast.
- Chloral, 349. To produce slee
  and check sweating.
- Chloroform, 3[illegible]2. With glyceri
  the cough in fibroid phthisis.
- Chlorate of potash, 195.
  solution to be drunk *ad libitum*
- Cod liver oil, 291. Very valuab
  forms of this disease, especiall
  ment. (See ref.)
- Counter-irritation, 80. Only
  in acute forms, as iodine li
  cough and diminishes expector
  or fibroid phthisis.
- Creosote, 314. Tar, or carbolic
  expectoration.
- Croton-chloral, 357. In the nig
- Croton oil, 295. With or witho
  as counter-irritant to chest. C
  used.

PHTHISIS—*continued.*

Enemata, 542. Of starch and laudanum for the diarrhœa.
Gelseminum, 493. For the cough.
Glycerine, 299. In last stage with water as wash for dry shiny mouth.
Hypophosphites, 181. Of lime or soda,—should be given alone. Most useful in early stage and in young subjects.
Iodine, 105. As liniment painted under clavicles in chronic forms to allay harrassing cough and to check secretion.
——— 107. As inhalation in chronic phthisis to lessen expectoration and cough.
Ipecacuanha, 398. Spray to throat when bronchial asthma and emphysema combined with fibroid phthisis.
Mercury, 235. The hundredth of a grain of corrosive sublimate every two or three hours in diarrhœa.
Opium, 539. Or morphia in a viscid vehicle for cough, especially where this is due to inflamed condition of throat—morphia lozenges very useful here.
——— 549. As Dover's powder for night sweats.
Oxygen, 84.
Phosphate of lime, 178. In diarrhœa.
——— 179. In chronic forms of phthisis with little or no fever.
Quinia, 579. In acute phthisis to reduce temperature.
——— 580. In chronic phthisis to check sweating. If a small dose fail, a dose of six or eight grs. administered at once or in portions repeated hourly.
Salicylic acid, 597. In five-gr. doses for foul breath and offensive expectoration.
Sea bathing, 12. If chronic, little or no fever, without active deposition of tubercle or scrofulous pneumonia.
Silver, nitrate of, 221. Sometimes injected into trachea. (See ref.)
Sponging, very hot, 22. For excessive perspiration.
Sulphuric acid, 145. With sulph. zinc, to check perspiration.
Sulphurous acid, 147. Inhalation, spray or fumigation in chronic phthisis.
Turkish baths, 29. For the cough.
Vinegar, 145. With laurel water to check sweats.

PILES.

Aloes, 602. To gently relieve bowels.
Bromide of potassium, 120. In five parts glycerine locally to ease pain.
Calomel, 304. As ointment.
Castor oil, 296.
Cold injection, 29. Half a pint before going to stool every morning.
Gallic acid, 303. With opium as ointment.
Hamamelis, 305. As lotion or injection as well as by mouth in bleeding piles.
Ice, 42. Locally applied for pain after operation.
Lead, 211. As plaster for pain in back due to piles.
Nitric acid, 143, 144. Strong, applied to internal piles, also to granular or ulcerated piles. Half ounce or one ounce to half a pint of water as lotion for bleeding piles.
Opium, 542. Mixed with gall ointment, an excellent application for painful bleeding piles. Mild purgatives also required.
Rhubarb, 607. About ten grs. of the root to be chewed nightly if a laxitive is needed
Useful also in hæmorrhoidal swellings of pregnancy.
Sulphur, 92. Five to ten grs. with one drachm conf. senn. in the morning as a laxative.

PITYRIASIS.

Borax, 152. Saturated solution locally several times a day in pityriasis of scalp. If not successful try it as glycerine of borax.
Glycerine of borax, 299. In pityriasis of scalp.
Lead, 210. Liq. plumb. 2 oz., Glycerine 2 oz. to 4 oz. of water as lotion.
Mercury, 225. Citrine ointment especially when pityriasis of hairy parts of face. Often well to add tar ointment.
Sulphurous acid, 147. With glycerine in conjunction with warm baths.

PITYRIASIS VERSICOLOR.

Mercury, 225. The bichloride in solution 2 grs. to the oz. of water as a lotion.
——, 227. The oleate of mercury with ether applied with a camel hair pencil.
Sulphurous acid, 147. The B. P. acid with glycerine; warm baths should also be employed.

PLEURISY.

Aconite, 426. Has marked effect.
Antimony, 252. As tartar-emetic. (See Inflammation.)
Blisters, 79. Large and flying after subsidence of inflammation and fever, to further absorption of the fluid. The vesication, if any, should be healed at once.
Cod liver oil, 491. In chronic form.
Iodide of potassium, 115. To quicken absorption of inflammatory effusions.
Iodine, 105. As liniment to chest to promote absorption.
——— 107. Solution (weak at first) injected, after tapping the injection,—may contain other disinfectants.
Morphia injection, 537. Occasionally needed for severe pain.
Packing, 25.
Potash, 162. As liquor potassæ is occasionally employed in pleurisy to promote the absorption of the inflammatory formations, but it is unadvisable to use it long.
Poultices, 36, 80. Large, hot, and frequently renewed.
Sinapisms, 383. Large.
Veratrum viride, 404. Opinions differ as to whether it should be used in sthenic or asthenic forms.

PLEURODYNIA.

Actea racemosa, 417. When pleurodynia due to uterine derangements.
Belladonna, 105, 499. Generally liniment best, sometimes the plaster better.
Blistering, 83. Sometimes strong vesication necessary.
Croton oil, 297. Has been recommended in obstinate pleurodynia.
Chloral, 351. Made liquid with equal weight of camphor, and rubbed gently in.
Ether, 37. As spray sometimes immediately and permanently removes pain.
Iodine, 105. As a liniment.
Mustard, 105. As poultice.
Opium, 535. The liniment may be rubbed in, or sometimes a hypodermic injection of morphia may be necessary.
Poultices, 37. Very hot; followed by application of lint and oilskin; belladonna liniment generally better.

PNEUMONIA.
- Aconite, 426. Has marked effect.
- Antimony, 252. At commencement. If patient weak must take alcoholic stimulants as well.
- Blisters, 79. Lessen the pain; should be used in moderation.
- Morphia injection, 537. Sometimes needed for severe pain.
- Packing, 14. Some pack the chest only, renewing hourly.
- Phosphorus, 282. Especially when typhoid symptoms.
- Poultices, 36. To encircle whole chest in children.
- Quinia, 579. To reduce temperature.
- Salicylic acid, 597. And salicylate of soda reduce temperature, but do not seem to shorten fever.
- Sinapisms, 383. Large.
- Veratrum viride, 404. Opinions differ as to whether it should be used in sthenic or asthenic forms.

POISONING GENERALLY.
- Sulphate of zinc, 247. The best emetic.

POISONING BY ACIDS.
- Alkalies, 157. The least irritating to the stomach to be selected.
- Magnesia, oxide of, 171.

POISONING BY ALCOHOL.
- Cold water, 3. Smartly sprinkled on face.
- Cold douche, 27. Poured for some time from a height on to the head.

POISONING BY ALKALIES.
- Acids, 142. Dilute.

POISONING BY ANTIMONY.
- Alkalies, 157.
- Tannin, 255, 569. Or strong tea or coffee.

POISONING BY ARSENIC.
- Bicarbonate of magnesia, 157. Or other alkalies.
- Charcoal, 87. Half an ounce or more.
- Oxide of magnesia, 171.

POISONING BY BELLADONNA OR ATROPIA.
- Alkalies, 157. Especially bicarb. of magnesia in poisoning by alkaloids.
- Ammonia, 168. Breathed into air passages.
- Charcoal, 87. In poisoning by belladonna. Half an ounce or more must be given.
- Physostigma, 525. Possibly.

POISONING BY CHLORAL.
- Strychnia, 352. The antidote.

POISONING BY LEAD.
- Alkalies, 157. Especially bicarbonate of magnesia in poisoning by metallic salts.
- Iodide of potassium, 114. In chronic cases.
- Lukewarm drinks, 213. Or sulphate of soda, sulphate of magnesia, or freshly precipitated sulphide of iron; promote vomiting—use stomach pump—give milk with white of egg in *acute lead poisoning*.
- Sulphides, 94. As baths in chronic form.

POISONING BY MERCURY.
- Alkalies, 157. Bicarbonate of magnesia best.
- Baths, 240. Simple or sulphurous.
- Charcoal, 87. In poisoning by corrosive sub mate, half an ounce or more must be given.

POISONING BY NITRATE OF SILVE
- Alkalies, 157. Especially the bicarbonate magnesia.
- Chloride of sodium, 182.

POISONING BY OPIUM OR MORPHI
- Ammonia, 168. Breathed into air passages.
- Atropia, 521. Quarter to half a grain hy dermically.
- Bicarbonate of magnesia, 157.
- Bromide of potassium, 132. Controls disagr able effects of medicinal doses of opium.
- Charcoal, 87. Half an ounce or more.
- Cold water, 3. Smartly sprinkled on face.
- Cold douche, 27. Poured for some time fro height on the head.
- Stomach pump, 545, 570. Rouse patient, ke him constantly moving to prevent sleep, g strong coffee, apply cold affusion to head, a if necessary adopt artificial respiration.

POISONING BY OXALIC ACID.
- Lime, 174. Salts of.
- Oxide of magnesia, 171.

POISONING BY PHYSOSTIGMA.
- Atropia, 522. One-fiftieth to one-thirtieth o grain hypodermically, repeated till effects e dent.
- Chloral, 351. The antidote.

POISONING BY PHOSPHORUS.
- Turpentine, 283.
- Copper salts, 283. Better than turpentine.

POISONING BY PICROTOXINE.
- Chloral, 351. The antidote.

POISONING BY STRYCHNIA.
- Alkaline bicarbonates, 157. Magnesia best.
- Calabar bean, 473. As an antidote.
- Charcoal, 87. Half an ounce or more.
- Chloral, 351. The antidote, *see* p. 561.
- Nitrate of amyl, 363. Inhalation.
- Stomach pump, 556. If available befo tetanic symptoms, *animal charcoal*, tann solution of iodine, *chloroform inhalation*, inj tion of curare or of methyl and ethyl compou of strychnia, brucia or of thebaia, artific respiration, fats.

PREGNANCY. (*See Vomiting.*)
- Actæa. 417. To prevent miscarriages in ir table or prolapsed uterus.
- Bromide of potassium, 130. For frightful del sions in later months.
- Sea bathing, 9. In earlier months, unless the have been several miscarriages or the patie is of very excitable temperament.

PROLAPSUS.
- Ice, 42. Locally applied in prolapsus of rectu or uterus when parts inflamed.

PROLAPSUS—*continued.*

SULPHUR, 93. In prolapsus recti has a beneficial effect in addition to that due to laxative properties.
ALUM, 196. In solution six grains to the ounce in prolapsus ani and uteri.
TANNIN, 203. As catechu, kino, red gum, rhatany; hæmatoxylum injections to restrain prolapsus ani.
STRYCHNIA, 559. In prolapsus ani especially in children. If there is constipation nux vomica may be added to a purgative, as tinct. of rhubarb. If there is diarrhœa it should be checked.

PROSTATITIS.

CANTHARIDES, 381. A drop of the tinct. (five may be required) three or four times a day.
HOT INJECTIONS, 53. To relieve pain.

PRURIGO.

BORAX, 145. (See Pruritus).
CANTHARIDES, 380. Internally.
CARBOLIC ACID, 311. Oil of cade, &c. (See Pruritus).
CHLOROFORM, 330. As ointment to allay itching.
CYANIDE OF POTASSIUM, 533. Or hydrocyanic acid. (See Pruritus).
ICE, 42. For prurigo of vulva.
IODOFORM, 344. As ointment. One drachm to the ounce.
SULPHUR, 92. With tar and benzoated lard as ointment in genuine prurigo.
TURKISH BATH, 33. When unconnected with lice.
WARM BATHS, 21.

PRURITUS.

ALKALIES, 151. An alkaline solution such as a drachm of carbonate of potash or soda to a pint of water applied with a small piece of sponge in itching of urticaria or lichen. Solution of cyanide of potassium, same strength, better still.
ALUM, 198. A strong solution for pruritus vulvæ.
ARSENIC, 257. In itching of the nose accompanying asthma-like affections. (See Asthma).
BENZOIN, 3[illegible]4. The comp. tinct. painted on the skin in eczema, urticaria, &c.
BORAX, 154, 155. Five to ten grains to the ounce of hot water in pruriginous eruption on mucous membrane of vulva and vagina. In this complaint infusion of tobacco, iodide of lead as ointment, bismuth and morphia as ointment, chloroform as vapour, liniment or ointment; lead lotion, nitrate of silver, alum in solution, tannin in solution, are often useful, especially when alternated.
CAMPHOR, 367. An addition to dusting powders to allay heat and itching of eczema and intertrigo.
CARBOLIC ACID, 311. In chronic eczema, psoriasis and erythema, or better still liq. carbonas detergens, oil of cade, or oleum rusci.
——————— 312. A weak lotion (1 in 100) in pruritus ani and pudendi.
CHLOROFORM. 330. As ointment to allay itching of skin diseases.
CHROMIC ACID, 149. In solution locally applied.
CYANIDE OF POTASSIUM, 533. A drachm in a pint of water as lotion for urticaria, lichen, eczema, and prurigo where the skin is unbroken.
HYDROCYANIC ACID, 533. Thirty drops of B. P. acid in an ounce of water or glycerine may be used instead of the cyanide of potassium solution.

PRURITUS—*continued.*

LEAD, 210. Lotions ease itching of urticaria. A strong lotion useful in pruritus pudendi, especially where mucous membrane red and excoriated. If this is dependent on worms or a tumour, lotion useless.
MERCURY, 223. Strong solutions of bichloride, black wash, yellow wash, or mercurial ointment in itching of skin affections.
An ointment of a drachm of calomel to one oz. of lard is best, not, however, in urticaria.
Calomel ointment useful in pruritus ani, but less so in pruritus pudendi. In obstinate cases of these, blisters to thighs or leeches useful.
Calomel ointment useful in itchy scabbiness of scalp and in pityriasis of scalp.
Nitrate of mercury ointment will destroy lice.
SILVER, NITRATE OF, 219. To be painted every day or second day on a patch of lichen the size of the palm causing excessive irritation. A weak solution often relieves pruritus ani and pudendi; apply well with camel hair brush three or four times a day.
A strong solution in pruritus cutaneus of the meatus auditorius without eruption on skin; memb. tymp. to be carefully avoided. If itching from dryness of ear or deficient secretion of wax, try first almond oil or glycerine.

PSORIASIS.

ARSENIC, 275. At first apparently aggravates the disease but soon heals it. Largest dose required five min. liq. arsen. three times a day —never on empty stomach. For rules for giving arsenic, see ref.
CANTHARIDES, 380. Internally.
CARBOLIC ACID, 311. Or better still liquor carbonas detergens, oil of cade, oleum rusci.
COPPER, SULPHATE OF, 244. Applied solid to spots of psoriasis, simple or specific.
MERCURY, 225. Calomel and nitrate of mercury ointment may be mixed, and tar ointment may be added, in patches of obstinate psoriasis, especially of hands, even when not syphilitic.
OILS AND FATS, 286. To lubricate skin, used in conjunction with warm baths.
SOAP, 151. Assists removal of scales.
SILVER, NITRATE OF, 219. Or sulphate of copper. An occasional application useful in psoriasis of the tongue and mucous membrane of mouth. If these are syphilitic, mercurials best,
SULPHIDES, 94. In baths—not in acute stage.
SULPHUR, 94. Internally.
TAR, 311. In obstinate forms may be painted on the patches and left on, or creosote ointment, petroleum, cade, and carbolic soaps of various strengths useful.
TURKISH BATH, 29.
WARM BATH, 21. Especially in acute stage, rain or boiled water.

PUERPERAL FEVER, ETC.

ANTIMONY, 254. As tartar-emetic for mania, but bromide and chloral better.
BROMIDE OF POTASSIUM, 131. For mania.
CHLORAL, 349. For mania and convulsions.
MORPHIA, 538. Hypodermically sometimes arrests puerperal convulsions.
TURPENTINE, 372. Has been used.

PUERPERAL PERITONITIS.

ANTIMONY, 252. As tartar-emetic. (See also Inflammation).
CHLORINE SOLUTION, 103. For washing out vagina.

PURPURA.
Ergot, 568. Has been strongly recommended.
Turpentine, 372. Has been used.

PYÆMIA AND SEPTICÆMIA.
Quinia, 579. Supposed to diminish temperature.
Warm bath, 21. Stump to be immersed to avert pyæmia.
Salicine, 597.

PYROSIS.
Bismuth, 209. Useful in the various forms whether acid, alkaline or neutral.
Lead, 212. Soluble preparations are recommended.
Nitric acid, 141. Or hydrochloric acid in small medicinal doses shortly before meals when pyrosis acid,—after when pyrosis alkaline.
Sulphurous acid, 148.

QUINSY. (*See Throat, Diseases of*).

RECTUM, DISEASES OF.
Bromide of potassium, 120. Locally, in five parts glycerine in fissures of rectum and painful growths.
Iodoform, 344. As suppository in painful diseases.
Phosphorus, 282. In chronic inflammation.

RENAL COLIC. (*See Colic*).

RESTLESSNESS.
Aconite, 429. One drop of tincture at bed time, repeated if needful.
Warm sponging, 21. To induce sleep and calm restlessness of convalescence.

RETENTION OF URINE.
Cannabis indica, 566. When from spinal disease.

RHEUMATISM, ACUTE.
Acid steam bath, 34. Relieves pain and checks perspiration.
Aconite, 429. Often subdues pain in inflamed joints and perhaps shortens the fever.
Actæa racemosa, 415. Has been much used, said to quell the pain speedily.
Bicarbonate or citrate of potash, 159-160. Opinions very divergent. Seems, however, to relieve pain.
Blistering, 82. Large flying blisters to inflamed joint.
Cold water treatment, 18. May be tried in hyperpyrexia.
Cold wet compress, 14. To painful joints.
Conium, 469. Internally to relieve pain.
Lime juice, 144. Eight oz. daily, lemon juice inferior.
Nitrate of potash, 192. In large doses (half oz. to one oz. in the day) freely diluted in water or lemonade—thought highly of by some.
Opium, 543. Hypodermically to relieve pain and induce sleep.
Packing, 14. If patient cannot be moved, front of body may be packed.
Poultices, 37. Very hot on the painful part.
Quinia, 580. Recommended by some (see ref.).

RHEUMATISM, ACUTE—c
Salicin, 594. Twenty or thi
two hours or even hourly at
ment generally in one or two
of fever much shortened. M
first sign of improvement.
Salicylic acid, 595. Behaves
very slightly soluble and liable
Salicylate of soda, 595. Beha
Sulphurous acid, 148. After fu
to be covered with bedclothes
exposed to strong fumes, this
ration, sleep and relief.
Tepid or cold sponging, 14.
against packing.
Turkish bath, 32.
Veratria, 403. As ointment to r
It often, however, fails.
———— 405. Veratrum virid
to be useful.

RHEUMATISM, CHRONIC.
Actæa racemosa, 415. Signally
after pain in most joints wit
joint becomes thickened and
allays pain and it almost ceases
Also useful in some other f
rheumatism.
Blistering, 83. Nightly.
Capsicum, 385. A strong infusio
for rheumatic pains.
Carbonic acid, 88. Natural wa
much carbonic acid used exter
Chloral, 351. Often relieves th
Cod liver oil, 292.
Cold douche, 29. For one or tw
Galvanism, 33. For pain and sti
———— 37. For pains remai
rheumatism.
Ice and salt, 43. Apply for
diseased joints then replace f
pounded ice.
Iodide of potassium, 115. Espec
worse at night, or of syphilitic
Iodine, 105. Paint round joints.
Lamp bath, 34.
Mercury, oleate of, and mor
joint affections (locally).
Nitrates, 193. Ten grains hour
hours when urine scanty and
becoming turbid on cooling.
Oil of mezereon, 375. And of sa
useful.
Packing, 14.
Poultices, 37. In so-called r
attacking one part of the body.
Sulphides, 94. As baths.
Sulphur, 94. Locally applied.
Turkish baths, 32-33. Generally
stiffness in shoulder.
Veratria, 403. As ointment to rh
often fails.

RHEUMATOID ARTHRITIS.
Actæa racemosa, 415. Especia
nected with uterine derangemen
cases (see ref.).
Arsenic, 256. As a bath containin
ing soda and twenty grs. arseni
————, 277. Large doses conti
time sometimes of great bene
capricious.
Bromide of potassium, 132. So
the severe pain.
Cod liver oil, 292.
Cold douche, 29. May be sligh
winter, use for one or two minut

RHEUMATOID ARTHRITIS—*continued.*
IODIDE OF POTASSIUM, 115. Sometimes large doses required (see p. 120).
IODINE, 109. Tinct. internally said to be better than pot. iod.
SULPHIDES, 95. In baths.
TURKISH BATH, 33.

RICKETS.
COD LIVER OIL, 292.
COLD SPONGING, 25. If the child is weak or very impressionable he should be allowed to stand up to the ankles in warm water before a fire while being sponged.
IRON, 205. Must be continued a long time.
LIME, 176. As lime water or carbonate of lime.
PHOSPHATE OF LIME, 179. Small doses as good as large.

RINGWORM. (*See Tinea*).

SALIVATION.
ACIDS, 138. As astringents in salivation. Small medicinal doses.
ALCOHOL, 319. Diluted, as gargle.
ATROPIA, 506. Hypodermically.
CHLORATE OF POTASH, 194. Whether mercurial or simple salivation.
CHLORINE SOLUTION, 104.
IODIDE OF POTASSIUM, 113. Sometimes beneficial in mercurial salivation but sometimes aggravates it.
IODINE, 109. Gargle, two drachms of tinct. to eight oz. of water.

SARCINÆ.
SULPHITES, 148. And hyposulphites have been employed to destroy sarcinæ and torulæ in the stomach.

SCABIES. (*See Itch.*)

SCARLET FEVER.
ACONITE, 427. To control accompanying inflammatory affections. Should be given if during convalescence any rise of temperature occurs.
BELLADONNA, 520. Has been recommended as a preventive.
CARBONATE OF AMMONIA, 169. In three or five grain doses hourly or every two or three hours in all forms, especially if given early.
CHLORINE WATER, 104. In sloughing of throat.
COLD AFFUSION, 26. During first few days when skin hot and red.
COLD WET COMPRESS TO THROAT, 14. Throughout whole course, renew every three hours.
FAT, 286. Rub hands and feet with a firm fat to remove heat and tightness produced by rash.
Some anoint whole body two or three times a-day with fat or oil, such as almond oil, to prevent desquamation, sequelæ and diffusion of branny particles of skin.
ICE, 42. Sucking, in the sore throat, especially at beginning.
JUNIPER, 377. Esteemed as a diuretic in scarlatinal dropsy.
MERCURY, 233. The third of a grain of grey powder every hour has marked effect on inflamed tonsils.
MUSTARD, 383. A general mustard bath on the recession of rash to bring it back.
NITRIC ACID, 139. Strong to sloughs in throat.

SCARLET FEVER—*continued.*
PACKING, 13. Throughout its course, especially on recession of rash.
SALICYLIC ACID, 597. And salicylate of soda lessen temperature.
STRYCHNIA, 553. Hypodermically for paralysis after scarlet fever.
SULPHATE OF MAGNESIA, 188. And other purgatives prevent sore throat and other sequelæ.
SULPHUROUS ACID, 147. Inhalation, spray or fumigation in malignant sore throat.
VERATRUM VIRIDE, 404. Has been employed in convulsions.

SCIATICA.
ACONITE, 419. As ointment, generally belladonna better.
ACUPUNCTURE, 44, 57. Along the course of sciatic nerve, often cures long standing cases.
ACTEA, 415.
ATROPIA, 507. Hypodermically, but generally morphia better.
BELLADONNA, 517.
CHLORIDE OF AMMONIUM, 182.
CHLOROFORM, 341. Inhalation.
COUNTER-IRRITATION, 81. Free vesication by cantharides—acupuncture sometimes very serviceable.
CROTON OIL, 297. Said to relieve unconstipated cases.
ETHER, 37. As spray, sometimes removes pain permanently—generally only temporarily.
GALVANISM, 37.
IODIDE OF POTASSIUM, 115. Sometimes relieves. but often fails.
MORPHIA, 536. A single hypodermic injection sometimes permanently cures long-standing cases. If not it may be repeated every second day or so.
POULTICES, 37. Applied very hot.
SULPHUR, 94. Locally.
TURKISH BATHS, 33.
TURPENTINE, 372. In half-ounce doses for four or eight successive nights, has been very successful.
VERATRIA, 402. As strong ointment. Veratrum viride as tinct. has also been recommended (p. 405).

SCREAMING AT NIGHT. (*See night Screaming*).

SCROFULA. (*See Sores*).
BLISTERS, 82. For scrofulous glands.
CHLORIDE OF CALCIUM, 176. Ten to twenty grain doses in milk after food when glandular enlargement of neck and chronic diarrhœa.
COD LIVER OIL, 291. Of great service in the various manifestations of this disease as chronic discharge from ears and nose, strumous ophthalmia, strumous disease of bones, abscesses, &c.
IODINE, 106. Tinct. or ointment applied over scrofulous glands—take care not to increase inflammation.
IRON, 205. Must be long continued.
PHOSPHATE OF LIME, 178. Of great use for scrofulous sores.
SULPHIDES, 99-101. For sores, abscesses, suppurating glands (see ref.).

SCURVY.
ACIDS, 144. Especially vinegar to prevent scurvy in the absence of lime juice or fresh vegetables.
ALCOHOL, 319. Diluted as gargle.
ATROPIA, 506. Hypodermically.

SEA SICKNESS. (*See also Vomiting*).
CHLORAL, 350.
CHLOROFORM, 331. Drop doses of pure chloroform.
SPINAL ICE BAG, 46.

SEMINAL EMISSIONS. (*See Spermatorrhœa*).

SEPTICÆMIA. (*See Pyæmia*).

SEXUAL DESIRE, INORDINATE.
CAMPHOR, 369.

SHINGLES. (*See Herpes*).

SICK HEADACHE.
ACONITE, 75. The ointment to be rubbed over the painful brow at commencement.
———— 418. As ointment in neuralgic sick headache.
BROMIDE OF POTASSIUM, 129. When associated with "nervous" state, which it often is at the "change of life."
———————— 355. When due to uterine disorder.
CANNABIS INDICA, 565. Especially valuable in preventing attacks when from fatigue, &c., they become unusually frequent. Useful where much or little sickness, also sometimes in the severe continuous forms.
May be combined in pill with iron or aloes.
CHAMOMILE, 599. A popular remedy.
CHLORIDE OF AMMONIUM, 182.
COUNTER-IRRITATION, 74. See ref. for discussion on.
CROTON CHLORAL, 353. Especially in the milder forms without severe vomiting and retching. Often bromide useful afterwards.
———————— 355. When the headache predominates.
FRIEDRICHSHALL WATER, 185. A wine-glassful in a breakfast cup of hot water for bilious sick headache.
GALVANISM, 571. The constant current (weak) or interrupted current.
GUARANA, 571. A powder every night and in the occurrence of an attack every three hours.
MERCURY, 243. As blue pill.
NITRATE OF AMYL, 364. As inhalation.
NUX VOMICA, 554. A drop of the tinct. very frequently in acute gastric catarrh with much headache and slight nausea.
PHOSPHORUS, 283.
PODOPHYLLUM, 412. When there is either diarrhœa or constipation with dark coloured motions. If the diarrhœa is of a light colour the hundredth part of a grain of bichloride of mercury three times a day.
VALERIANATE OF ZINC OR OF AMMONIA, 378. In two to five gr. doses three times daily.
VERATRIA, 75. The ointment to be rubbed over the painful brow at commencement.
———— 403. As ointment where tenderness of skin present. It often subdues pain, prevents vomiting, and shortens the attack.

SICKNESS. (*See Vomiting*).

SKIN AFFECTIONS, CHRONIC.
COD LIVER OIL, 292. When syphilitic or otherwise.

SKIN, TORPID.
ACIDS, 137. Greatly diluted nitric or hydrochloric, as bath.

SLEEPLESSNESS.
ALCOHOL, 326. In fevers if it produce sleep and quell delirium.
BROMIDE OF POTASSIUM, 127. Especially when delirium like that of delirium tremens or accompanying mental anxiety, hysteria, pregnancy, and general nervous irritability. Dose 20 to 30 grs. It increases hypnotic effect of hyosc., bellad., can. ind., ether and chlorof.
CANNABIS INDICA, 565. Rather uncertain.
CHLORAL, 348. In old people, delirium tremens, paralysis of insane, acute mania, puerperal mania, puerperal convulsions, typhus, phthisis, convulsions of children.
CODEIA, 550. And narcein, both soporifics.
CROTON CHLORAL, 357. One drachm may be given.
ETHER, 343. Or spirits of chloroform in a full dose.
HYOSCYAMUS, 529. When opium disagrees.
MORPHIA, 537. Hypodermically injected in acute mania, delirium tremens, chorea, &c.
OPIUM, 542. A rectal injection sometimes succeeds best, *e.g.*, for dyspeptics or convalescents from acute disease, also used in delirium tremens and traumatic delirium.
———— 546. In fevers.
———— 547. The time of administration important—should be given so as to act at the time when the patient is naturally inclined to dose.
It should not be given in chronic sleeplessness independent of any very notable disease, chloral and bromide of potassium much better in dyspepsia and uterine derangements.
REMOVAL INLAND, 10. When restlessness at night is produced by sea-bathing.
TARTAR EMETIC, 253. In the delirium of typhus and other fevers.
WARM-BATH, 21. Or sponging, in fever and convalescence.

SMALL POX.
ACTEA RACEMOSA, 415. Given internally by some who assert that it prevents pitting.
COLLODION, 284. Or solutions of India rubber or gutta percha in chloroform prevent pitting in small-pox.
LIME, 174. Cotton wool cut in proper shape is dipped into lime liniment and applied to face and neck to prevent pitting.
MERCURY, 231. Formerly used in ointments or plasters to prevent pitting.
SILVER, NITRATE OF, 218. By fourth or fifth day puncture vesicles with needle dipped in solution 20 grs. to 1 oz., or simply paint the skin. This plan prevents spitting.
PACKING, 13. Especially on retrocession of rash.

SNEEZING.
ARSENIC, 259. A drop of the liquor three times a day in paroxysmal sneezing allied to asthma.
CAMPHOR, 367. In incessant sneezing with profuse running from eyes and nose. The powder should be sniffed or the alcoholic solution inhaled.
IODIDE OF POTASSIUM, 113. In paroxysmal sneezing ten grs. several times a day.
IODINE, 108. Inhalations in paroxysmal sneezing with itching at the nose.

SOMNAMBULISM.

- **Bromide of potassium**, 130. In the somnambulism of children which is allied to epilepsy.

SORE NIPPLES. (*See Nipples, Sore*).

SORES. (*See also Ulcers*).

- **Alcohol**, 319. To cover sores with thin protecting layer of coagulated albumen.
- **Alum**, 197. Dry or in solution to relaxed and abundantly secreting sores.
- **Camphor**, 367. For dusting on indolent sores.
- **Carbolic acid**, 306, Applied as stimulant and antiseptic.
- **Caustic alkalies**, 150. Applied to hard edges.
- **Charcoal**, 86. Locally to sloughing sores.
- **Chlorine solution**, 103. For sloughing and indolent sores, as a wash.
- **Cinchona**, 572. The powdered bark dusted over sloughing ulcers, &c.
- **Copper**, 244. The sulphate as stick, solution or ointment to indolent sores.
- **Glycerine of carbolic acid**, 299. A good application to fœtid sores.
- **Iodide of starch**, 40. As a poultice, cold. (See ref.)
- **Iodoform**, 344. Dusted over spreading or sloughing sores.
- **Lead**, 210. The soluble salts as lotions to unhealthy over-secreting sores.
- **Lime**, 172. As carbonate or lime water to check discharge.
- **Mercury**, 229. Calomel ointment or blackwash in scrofulous or tubercular lupus, and in open scrofulous sores.
- **Nitric acid**, 136. To surface of unhealthy and indolent sores.
- **Opium**, 535. Or morphia with glycerine as an application to cancerous or simple sores, to relieve pain.
- **Oxygen**, 84. To atonic painful sores.
- **Phosphate of lime**, 178.
- **Sulphide of calcium**, 96. When thin ichor discharged.
- **Tannin**, 300. Or glycerine of tannin to coat over wounds and profusely discharging sores.
- **Yeast**, 39. As poultices in sloughing sores.
- **Zinc, sulphate of**, 246. To unhealthy free secreting sores.

SORE THROAT. (*See Throat, Diseases of*).

SPASMODIC AFFECTIONS.

- **Aconite**, 424. In spasmodic laryngitis rapidly produces good effects.
- **Atropine**, 507. Hypodermically in local spasm.
- **Ammonia**, 168. Useful in children's intestinal colic., &c.
- **Camphor**, 369.
- **Chloroform**, 330. Vapour in spasm of intestines.
- **Hot sand, chamomile flowers or tile**, 41. Locally in painful "spasms."
- **Opium**, 548. Very useful as an antispasmodic especially if given with a stimulant as alcohol, ether, or chloroform.
- **Sulphocarbolates**, 314. In flatulent "spasms"; sometimes phosphorus better.

SPERMATORRHŒA.

- **Belladonna**, 520. Quarter gr. of the extract with one and a half gr. zinc. sulph. three or four times a day often successful in cases of nocturnal seminal emissions.

SPERMATORRHŒA—*continued.*

- **Bladder to be emptied after first deep sleep**, 131.
- **Bromide of potassium**, 131. Supplemented by cold sponging of scrotum and perinæum and suspension of testes in water; use of a hard mattress and abstention from suppers; patient to be waked up after six or seven hours sleep.
- **Cantharides**, 382. With iron internally in emissions.
- **Cold douche**, 28. To perinæum and buttocks with suspension of testicles in cold water.
- **Cold sponging**, 25.
- **Digitalis**, 458. One or two drachm doses of the infusion very efficacious.
- **Hypophosphites**, 181. Of lime or soda.
- **Phosphorus**, 283. For physical and mental debility induced by spermatorrhœa.
- **Quinia**, 580. Has been recommended.
- **Spinal ice bag**, 45.
- **Strychnia**, 559. In large doses, especially when associated with impotence.

SPINAL IRRITATION.

- **Aconite**, 419. As ointment.
- **Belladonna**, 419. Preparations locally applied generally better than those of aconite.

SPRAIN.

- **Cold douche**, 18. Salt may be added. The force must be regulated by condition of tissues.

STINGS.

- **Ammonia**, 167. Weak solutions in stings of insects to neutralise the formic acid.

STOMACH, DISEASES OF. (*See Vomiting*).

- **Acids**, 141. Nitric or hydrochloric in small doses for acid eructations, heartburn and discomfort in chest and epigastrium, due to excess of acid in stomach.
- **Alkalies**, 157. In pain of stomach. Liquor potassæ generally used.
- **Ammonia**, 168. Internally as an excitant when functions of stomach and upper intestines depressed.
- **Arsenic**, 269. A drop of liq. arsen. before food in irritative dyspepsia, and in vomiting of drunkards. Useful in chronic ulcer and cancer; also in heartburn and gastralgia, and in chronic dyspepsia with diarrhœa which is excited by food.
- **Belladonna**, 508. In some painful affections.
- **Bismuth**, 208, 209. Especially the nitrate, ease the pain in both organic and functional diseases—as cancer, chronic ulcers, chronic inflammation, and especially chronic gastritis of drunkards, also in gastrodynia, and cramp; acute and chronic catarrh of stomach in children causing vomiting yield to this, also the various forms of pyrosis.
- **Carbonic acid water**, 89. In painful and irritable conditions, may be mixed with milk, useful where constipation.
- **Charcoal**, 87. In ulcer of stomach, also in neuralgia.
- **Chloral**, 351. Sometimes relieves pain of gastralgia.
- **Chloroform**, 331. Drop doses in flatulent distension, sea sickness and other vomitings.
- **Conium**, 469. Sometimes relieves pain of cancer.
- **Counter-irritation**, 81. At epigastrium often allays pain and obstinate vomiting due to disease of stomach.

STOMACH, DISEASES OF—*continued.*

Creosote, 313. Checks pains after food, also many forms of vomiting.

Hydrocyanic acid, 533. Much used in painful diseases as chronic ulcer, cancer, chronic gastritis, gastralgia, &c., may check vomiting as well as relieve pain.

Ice bag, 42. To epigastrium for pain and vomiting in cancer, ulcer, &c.

Iron, 201. Astringent preparations in hæmorrhage from stomach.

Lead, 212. Soluble preparations have been recommended in pyrosis.

Lime water and milk, 174. When disease.

Magnesia, ;172. As oxide and carbonate—action mild—very suitable for children—often combined with rhubarb.

Bicarbonate, or as it is called fluid magnesia, is a useful and mild aperient.

Nutrient enemata, 55. In painful diseases as chronic ulcer, and when persistent vomiting.

Nux vomica, 389 and 554. One or two drops of the tinct. every two hours or oftener when tongue coated and there is chronic catarrh of stomach in the course of chronic disease, also when there is flatulence and indigestion, or heartburn. Five drops a quarter of an hour before food three times a-day in dyspepsia with heat and weight on top of head, common amongst women, also in heartburn.

——— 554. One drop every five or ten minutes for eight or ten doses in acute gastric catarrh with headache or sick headache.

Opium, 540. Or morphia, to quell pain of many stomach affections and to relieve the vomiting, thus it is useful in cancer, chronic ulcer and chronic gastritis from excessive indulgence in alcoholic drinks.

——— 541. For the pain, nausea and want of appetite accompanying alcoholism, small doses of morphia combined with tonics very efficacious. For gastrodynia with heartburn, small doses of morphia with bismuth.

Silver, nitrate of, 221. Given in solution to check pain and vomiting of chronic inflammation, chronic ulcer, and even cancer.

Strychnia, 552. Hypodermically for gastralgia and gastrodynia.

Sulphites and hyposulphites, 148. To destroy sarcinæ and torulæ. .

Tannin, 303. Sometimes given for irritative dyspepsia, also in hæmorrhage.

Turpentine, 370. In hæmorrhage from chronic ulcer, &c., five to ten drops frequently repeated.

Zinc, sulphate of, 247. In less than emetic doses in painful affections due to chronic inflammation of mucous membrane.

STOMATITIS. (*See Mouth, Diseases of*).

Acids, 138. As astringents in ulcerative stomatitis, others, however, are preferable.

Alum, 197. In ulcerative stomatitis, applied dry with the finger many times a-day, especially where disease affects one half the jaw.

Chlorate of potash, 194. In ulcerative stomatitis.

Copper, Sulphate of, 244. Solution painted over edges of gums in ulcerative stomatitis. Generally dry alum better.

Glycerine of tannin, 303. In ulcerative stomatitis.

Lime water, 174.

Salicylic acid, 597. One part (dissolved in sufficient alcohol) to 250 parts of water eases pain of catarrhal stomatitis.

STONE

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SYPHILIS—*continued.*

The cyanide, ten to fifteen grains in an ounce of water may be applied to rashes and sores on throat, tongue, penis, anus, &c. For those on the prepuce five grains to the ounce quite strong enough. Should be applied with soft brush to chancres and these should be kept moist with lint soaked in black wash.

Mercurial applications mixed with tar, &c., are useful in syphilitic psoriasis.

Mercurial fumigations, moist or dry, for eradicating syphilis. These sometimes produce prostration.

——— 231. Mercurial and calomel ointments may be rubbed into delicate parts of the skin to mercurialize the system.

Bichloride has been injected subcutaneously.

In syphilitic ozœna nitrate of mercury ointment, partially melted may be applied twice a day after nose well cleared.

For discussion on the use of mercury in syphilis see pp. 240-243.

——— 227. The twenty per cent. ointment of the oleate in the axilla useful for both children and adults.

NITRIC ACID, 144. In secondary syphilis.

OILS OF MEZEREON AND SASSAFRAS, 375. Reported useful.

ZINC, 246. Chloride, iodide, nitrate, locally to syphilitic ulcers.

TEETH, AFFECTIONS OF.

ACONITE, 418. Ointment or liniment for facial neuralgia due to diseased teeth; will succeed quickly if at all.

ARSENIC, 255. As escharotic to destroy pulp.

——— 257. When for pain may be mixed with opium. It sometimes at first aggravates pain.

BROMIDE OF POTASSIUM, 127. For irritability and convulsions in teething.

CAPSICUM 385. A strong infusion applied on lint for toothache.

CHLORAL, 351. Rubbed up with equal weight of camphor and rubbed gently in externally or put into cavity.

CROTON CHLORAL, 357. Sometimes promptly relieves toothache.

CHLOROFORM, 330. Two or three drops on cotton-wool in ear, or into tooth, or hold over hollow tooth a bit of rag moistened with chloroform.

——— 331. Equal parts of chloroform and creosote a good application.

CINCHONA, 572. Powdered bark often used in tooth powders.

COLLODION, 284. Mixed with crystalized carbolic acid, which has been melted in a test-tube, may be inserted into a tooth with exposed and inflamed pulp on cotton wool, the pain may be at first increased but is soon abolished.

CONIA, 463. Solution in alcohol may be introduced into a hollow painful tooth.

CREOSOTE, 313. With tannin or opium into hollow of decayed tooth often gives relief.

GELSEMINUM, 487 and 498. In some forms of toothache.

HOT WATER, 48. Rinse with--sometimes cold better.

HYPOPHOSPHITES, 181. Of lime or soda in teething.

IODINE, 108. Tincture painted over gums close to teeth when these begin to recede and expose teeth. Also to remove tartar from teeth.

MORPHIA, 537. Hypodermically injected for severe toothache.

OPIUM, 539. Mixed with tannin or creosote and inserted into the hollow of a painful tooth, where inflamed pulp exposed.

VOLATILE OILS, 373. In toothache.

ZINC, CHLORIDE OF 247. To destroy exposed painful pulp.

TETANUS.

CALABAR BEAN, 475. If possible by mouth, if not, hypodermically or by anus. It must be pushed till just short of arresting the breathing, and should be given at the very beginning. The liquid extract is used.

CHLORAL, 350. In large doses has sometimes cured.

CONIA, 469. Hypodermically.

NICOTIA, 462. By rectum or hypodermically, appears to be useful in many cases.

NITRITE OF AMYL 362. Inhalation may be tried or it may be given subcutaneously.

SPINAL ICE BAG, 45, 46.

THIRST.

ACID DRINKS, 134. In fevers, promote secretion of saliva.

ICE, 42 and 47. Sucking ice allays thirst.

TEPID DRINKS, 47. In diabetes.

THREAD WORMS. (*See Worms*).

THROAT, DISEASES OF.

ACONITE, 422-425. In tonsillitis and acute sore throat, when temperature high, drop or half drop doses of the tincture every quarter of an hour for two hours, then every hour will almost certainly prove efficacious.

ACTEA RACEMOSA, 415. In simple and malignant sore throat, and when mucous membrane of pharynx dry and spotted over with inspissated mucus.

ALCOHOL, 319. Diluted, as gargle in relaxed throat, scurvy, salivation, &c.

ALUM, 197. Dry or in solution, in simple or scarlatinal sore throat in tonsilitis and even diphtheria.

Gargles in chronic inflammations, but glycerine of tannin better.

ANTIMONY, 252. One quarter to one half a grain of tartar emetic every hour in tonsillitis.

ANTISEPTIC SOLUTIONS, 104. In sloughing.

ARSENIC, 257. In medicinal doses in sloughing of throat or malignant sores.

BELLADONNA, 508. Internally in several inflammatory diseases, especially when throat and tonsils acutely inflamed and much swollen—may be given with aconite.

CAPSICUM, 385. One drachm of the tinct. to half a pint of water as a gargle in some sore throats, and in the very early stage of tonsillitis and pharyngitis, also in malignant sore throat and in relaxed throat.

COLD COMPRESS, 425. Used nightly to harden throat, when tendency to catarrh. It should be swabbed daily with glycerine of tannin. Inhalations of sulphurous or carbolic acid useful.

CREOSOTE, 313. Or carbolic acid gargle in sloughs of throat.

GLYCERINE OF TANNIN, 303. After acute inflammation; in ulceration in apthous sore throat; in chronic inflammation; often when accompanied by deafness or cough, provided no catarrh or phthisis or teething irritation.

ICE, 42. Very valuable, constantly sucked in tonsillitis, sore throat, &c.

IODINE, 109. Tincture applied locally to sores whether syphilitic or not.

IPECACUANHA WINE, 398. As spray in non-inflammatory sore throats and hoarseness from congestion of vocal cords.

MERCURY, 233. In acute tonsillitis when tonsils almost meet, the third of a grain of grey powder every hour beneficial even if an abscess has formed.

Throat, diseases of—*continued.*

Mercury and morphia oleate of, 227. In obstinate and painful tonsillitis.
Nitric acid, 139. Applied undiluted to foul sloughs.
Nitrate of potash, 192. Crystals sometimes sucked in acute inflammation but other remedies preferable.
Nitrate of silver, 220. In early stage of inflammation locally applied may cut it short. Solutions are used in chronic sore throat, but generally tannin and other astringent but non-irritant applications better unless in a sloughing condition. Sometimes used in diphtheria on inflamed patches only. Sometimes applied to chronically inflamed larynx as in phthisis by brush or spray.
  Sometimes injected into trachea in asthma, bronchitis, and phthisis (see p. 221).
Sulphurous acid, 147. Inhalation, spray or fumigation, for maglignant sore throat, whether scarlatinal or otherwise.
Tannin, 303. A spray of five per cent. tannin in diphtheria and croup.
Zinc sulphate of, 247. As gargle occasionally employed in relaxed throat.

Thrush.

Borax, 156. With honey or as glycerine of borax.
Copper, Sulphate of, 245. A weak solution to be painted over mucous membrane.
Glycerine, 299. Will sometimes cure.
Glycerine of borax, 299.
Salicylic acid, 597. One part (dissolved in alcohol) to 250 of water.
Sulphurous acid, 147. As solution, strong or diluted, locally applied.

Tic. (*See Neuralgia*).

Tinea favus.

Mercury, 225. A lotion of two grs. of the bichloride in an oz. of water applied after each epilation, as oleate (see Tinea sycosis).
Oils, 286. To facilitate removal of scabs—poultices used also preparatory to epilation.
—— 287. Head to be greased freely to prevent spreading. Other members of family should also grease freely. A mild mercurial pomade or quinine in glycerine best.
Sulphurous acid, 147. The pharmacopœia acid with glycerine. If the case is obstinate epilation assists.

Tinea sycosis.

Mercury, 225. A lotion containing two grs. of the bichloride to an oz. of water, to be applied after each epilation.
———— 227, The five per cent. solution of oleate in oleic acid with the addition of an eighth part of ether.

Tinea tarsi.

Blisters, 225. To temple, frequently repeated in obstinate cases.
Mercury, 225, The irritant ointments. Eyelashes to be cut short and ointment applied night and morning after picking off scabs. Ung. hydrarg. nit. should not be diluted to more than half its strength. Sometimes best undiluted. As oleate, see Tinea sycosis.
Silver, nitrate of, 220. Solid in obstinate cases after removal of scabs.
Sulphate of copper, 244. As nitrate of silver, but milder.

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Typhus fever. (*See Fevers*).
Antimony, 253. In the delirium with wakefulness — tartar-emetic combined with opium. (See Fever).
Belladonna, 508. Said to clean the tongue. (See also pp. 519-520).
Chloral, 349. To produce sleep and allay violent delirium.
Cold affusion, 19.
Quinia, 576. To reduce temperature.

Ulcers. (*See also Sores*).
Chlorate of Potash. 194. In solution as a wash to clean and stimulate foul ulcers—other remedies better.
Cinchona, 572. The powdered bark dusted over foul, indolent, sloughing and gangrenous ulcers promotes the healing process.
Conium, 463. Locally applied by means of a poultice, will ease the pain and improve the character of the sore.
Nitric acid, 136, 138. Locally to destroy foul, unhealthy surface. As lotion to indolent and painful ulcers.
Silver, nitrate of, 217. Applied to unhealthy ulcers. Also to ulcers of mouth (p. 220).

Urine, suppression of.
Copious injections, 53. Beneficial in some cases.

Uric acid, excess of, in urine.
Alkalies, 158-159. Citrates are best.

Urticaria.
Alkalies, 151. (See Pruritus).
Benzoin, 374. The comp. tinc. painted on the skin for itching.
Chloroform, 330. As ointment to allay itching.
Colchicum, 408. In gouty persons.
Cyanide of potassium, 533. Or hydrocyanic acid. (See Itching).
Lead, 210. Lotions to ease itching).
Nitric acid, 137. A dilute wash controls itching and prevents wheals.
Warm baths, 21.

Uterine diseases.
Actæa racemosa, 415, 417. To prevent miscarriages in irritable uterus and prolapsus.
Belladonna, 506. With tannin as suppository in neuralgia of uterus.
Camphor, 368. A saturated solution in eau de Cologne to be rubbed into the head for drowsiness or headache of uterine origin.
Carbolic acid, 312. A weak solution as injection in cancer, &c.
——————— 317. Pure in ulcer of os and cervix and chronic inflammation of uterus or cervix. (See ref.)
Carbonic acid gas, 88. Injected up vagina for pain of ulceration of os, cancer and neuralgia of uterus.
Caustic lime, 172. Mixed with caustic potash as escharotic in affections of neck of uterus.
Chloroform, 330. As spray in cancer, ulceration of os, and neuralgia, must be continued some minutes.
Ergot, 567. Hyphodermically for fibrous tumour.
—— 568. The most valuable medicine known for uterine hæmorrhage—must be given in full doses and repeated every hour or so. Dry cupping over the sacrum useful, perfect rest necessary.

Uterine diseases—*continued.*
Glycerine, 299. In congested neck of womb a pledget of cotton wool saturated with glycerine and applied for several hours will induce a copious discharge of serum which will give as much relief as leeches,—a piece of twine should be fastened to it.
Glycerine of tannin, 304. Checks discharge and stench of cancer, better still if mixed with glycerine of carbolic acid.
Iodoform, 344. As bolus with cocoa fat inserted into excavation produced by cancer.
Iron, 208. Locally in uterine catarrh.
Lead, 211. As plaster for pain in back due to uterine disease.
Opium, 542. An injection into the rectum of laudanum and starch will subdue the pain of uterine diseases.

Vaccination.
Aconite, 428. For erysipelatous redness after vaccination. This treatment may be supplemented by the local application twice daily of belladona ointment.

Vaginitis. (*See Vulvitis*).
Glycerine of tannin, 301. In chronic vaginitis of children.

Varicocele.
Cold douche, 29. To perinæum and buttocks, with suspension of testicles in cold water.
Hamamelis, 305.

Vomiting.
Acids, 141.
Alum, 198. In six to ten gr. doses in obstinate vomiting of phthisical patients excited by coughing.
Arsenic, 269. One drop of liq. arsen. before food in vomiting of drunkards, also in chronic vomiting without pain or nausea, has been recommended in vomiting of cholera.
Belladonna, 508. Has arrested obstinate forms of the vomiting of pregnancy.
Bicarbonate of soda. 174. Half drachm to a drachm to a pint of milk for infants especially if constipated. If lime water and bicarbonate of soda both fail, stop all milk and feed on sopped bread, water gruel and chicken or veal broth.
Bismuth, 208. In many forms of vomiting in children, especially when due to acute or chronic catarrh of the stomach.
Carbonic acid water, 89. With milk.
Chloroform, 331. In drop doses, pure, in seasickness and other vomiting.
Counter-irritation, 81. At epigastrium often allays pain and obstinate vomiting due to diseases of stomach.
Creosote, 313. In sea-sickness, pregnancy, cancer, ulcer of stomach and Bright's disease.
Gelatine, 175. With milk, cream, and arrow root, as food for young children. (See ref.)
Hydrocyanic acid, 533. Sometimes checks vomiting as well as relieves the pain of chronic ulcer, cancer, chronic gastritis, gastralgia, &c.
Ice bag, 42. To epigastrium for pain and vomiting of cancer, &c.
Ipecacuanha, 172. In sympathetic vomiting.
——————— 388. In pregnancy (see ref.) at menstrual times, in the morning vomiting of drunkards, but here arsenic generally better. In morning vomiting from weakness and in convalescents, in acute catarrh of the stomach

VOMITING—*continued.*

in children—may be combined with aconite if inflammation great, in whooping cough—here sometimes alum better. In the vomiting occurring without nausea immediately after meals—here arsenic better.

LIME WATER, 174. In chronic forms, as from chronic ulcer, mixed with milk—if vomiting incessant, patient should be fed on this only in frequent small quantities. Milk with one-eighth of lime water often sufficient for infants in whom the gastric juice coagulates, milk causing vomiting, wind, and colic. If they are constipated bicarb. of soda better. (See above).

MAGNESIA, 172. In sympathetic vomiting—effects very transient.

MERCURY, 233. As calomel, or better still grey powder, one-third grain every two hours in the sudden forcible vomiting of children. Small doses frequently given are useful when vomiting accompanied by clayey stools.

MORPHIA, 538. Hypodermically in pregnancy as well as other severe forms. Often arrests persistent hiccup.

NUTRIENT ENEMATA, 55. In persistent vomiting.

NUX VOMICA, 389. When tongue coated with thick fur—may be given with ipecac.

OXALATE OF CERIUM, 172. One grain every three hours in sympathetic vomiting.

QUINIA, 172. In sympathetic vomiting.

——— 580. Sometimes useful in vomiting of pregnancy.

SPINAL ICE BAG, 46. In pregnancy and sea sickness.

VERATRUM ALBUM, 405. In vomiting and purging of summer diarrhœa.

VULVITIS.

ALUM, 196. A lotion, or if inflammation higher up an injection of sixty grains to a pint of water, to be used every hour or oftener. The strength is occasionally too much.

GLYCERINE OF TANNIN, 301. In chronic vaginitis of children.

LEAD, 211. Solutions of the acetate or diacetate as wash when acute stage just subsided—later on stronger astringents needed.

LIME WATER, 174. As a wash.

WARTS.

ARSENIC, 255. Arsenious acid as a caustic—enough to be used to excite active inflammation. (See ref.)

——— 256. Liquor arsenicalis may be painted over warts.

CAUSTIC ALKALIES, 150. Undiluted or mixed with caustic lime, locally.

CHROMIC ACID, 149. A solution of 100 grs. to one oz., applied with a glass rod so as just to saturate the diseased growth, any superfluous acid to be removed; dress with dry lint.

GLACIAL ACETIC ACID, 137. superficial.

MERCURY, NITRATES OF, 228. Locally applied.

NITRIC ACID, 137. A drachm or two of the dil. acid to a pint of water, as a wash to keep small syphilitic warts and condylomata constantly moist.

SILVER, NITRATE OF, 217. As caustic, but too

ZINC, 246. Chloride, iodide and nitrate locally.

WASTING DISEASES.

PHOSPHATE OF LIME, 178. In chronic cases.

WHEEZING.

ARSENIC, 274. In emphysematous persons—
Emphysema.) In the wheezing of chi
with oppressed breathing.

WHITE SWELLING.

IODINE, 106. A solution injected into the jo

WHITLOW.

ANTIMONY, 252. As tartar-emetic. (See
flammation).

CARBOLIC ACID, 306. To benumb the s
during incision.

WHOOPING COUGH.

ALUM, 199. When acute stage is over and
is no complication two to six grs. every
hours, or less every hour in glycerine or b

BROMIDE OF POTASSIUM, 122. Especially in
mer. When uncomplicated, except with
vulsions.

BELLADONNA, 518. Especially during third
Children bear this drug well; ten minims
tinct. may be given hourly to a child t
three years old.
Of little use if complications exist.

CANNABIS INDICA, 566. Has been found use

CARBONATE OF POTASH, 162. In one or two
doses.

CHLORIDE OF AMMONIUM, 182.

CHLOROFORM, 330. Or ether, to lessen violen
paroxysms.

CLOVER, 563. A wine glassful occasio
through the day of an infusion made of
ounces of carefully dried red blossoms ste
in a pint of boiling water for four hours.

COD LIVER OIL, 292. In middle and after sta

CONIUM, 468.

ERGOT, 569. Said to be useful.

IPECACUANHA, 399. Useful in many cases.

LIME WATER, 176. Useful from its astringe
as in some forms alum and tannin adva
geous.

LOBELIA, 563. In spasmodic stages. Chil
very tolerant of this drug; for a child two y
old, ten min. of the tinct. every hour an
additional dose each time the cough is im
nent, provided the paroxysm gives suffic
warning.

MUSK, 318 Has been given.

MUSTARD, 384. Said to be useful.

OPIUM, 548. In convulsive stage. Suffic
should be given to produce slight heavi
which should be maintained. (See ref.)

SENEGA, 608. Given by some.

SILVER, NITRATE OF, 221. A solution for spon
out throat or as spray. As spray when pat
more than two or three years old.

TANNIN, 303. Applied to throat.

VALERIAN, 378. Preparations said to con
paroxysms.

ZINC, 248. As oxide or sulphate.

WORMS.

ALUM, 611. As solution for injection.

ARECA NUT, 611. For tape worm.

CHLORIDE OF AMMONIUM, 182. To prevent
mation of thick mucus which serves as n
for worms

COMMON SALT, 611. Chloride of ammonium
antimony to remove catarrhal state of
cous membrane.

FELIX MAS, 609. For tape worm, to be take
an empty stomach and followed by a pu
(See ref. for directions).

WORMS—*continued.*
Injections, 54. For thread worms ; enough liquid should be used to reach a little higher than the rectum. Half a pint enough for an adult. Solution of salt, iron, &c., must not be too concentrated lest inflammation ensue.
Iron, 202. Tinct. ferr. sesquichlor half an ounce in a pint of water, a good injection for thread worms. Coagulating albumen.
Kamela, 611. For tape worm.
Kousso, 609. For tape worm.
Lime water, 176 and 611. As injection for thread worms.
Punica granatum, 610. As infusion for tape worms.
Quassia, 598. The infusion useful for ascarides, as injection or by mouth.
Quinia, 517 and 612 As a tonic. Also cold sponging, out-door exercise, and judicious diet. Useful probably by preventing the production of the abundant mucous which favours the growth of worms.
Santonin, 610. For round and thread worms, in castor oil by mouth or as an injection.
Scammony, 604. For thread worms in the rectum.
Tannin, 303. As catechu, kino, red gum, rhatany, hæmatoxylum in injections to destroy thread worms.
Tonics, 612. As cod liver oil and iron to restore intestinal canal to healthy condition.

WORMS—*continued.*
Turpentine. 370. As poison to tape and thread worms. (See also p. 611).
Valerian, 377. Esp. when convulsions.
Oils, 612. Reputed vermicides.

WOUNDS.
Aloes, 601. Topically as a slight stimulant—often purges.
Carbolic acid, 307. For Lister's Method. (See ref.).
Collodion, 283. Painted over to adjust edges and exclude air.
Opium, 542. To quiet intestinal movements in wounds of the abdomen.
Ice and salt, 43. Applied to wound prevents inflammation.
Sulphurous acid, 147. Solution constantly applied, diluted or not.
Tannin, 300. Or glycerine of tannin to coat over wounds.
Turkish bath, 29. For pain in the seat of old wounds.

XERODERMA.
Glycerine, 298. Glycerine of starch to be rubbed in daily after a bath.
Oils and fats, 286. In conjunction with warm baths to lubricate skin.

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